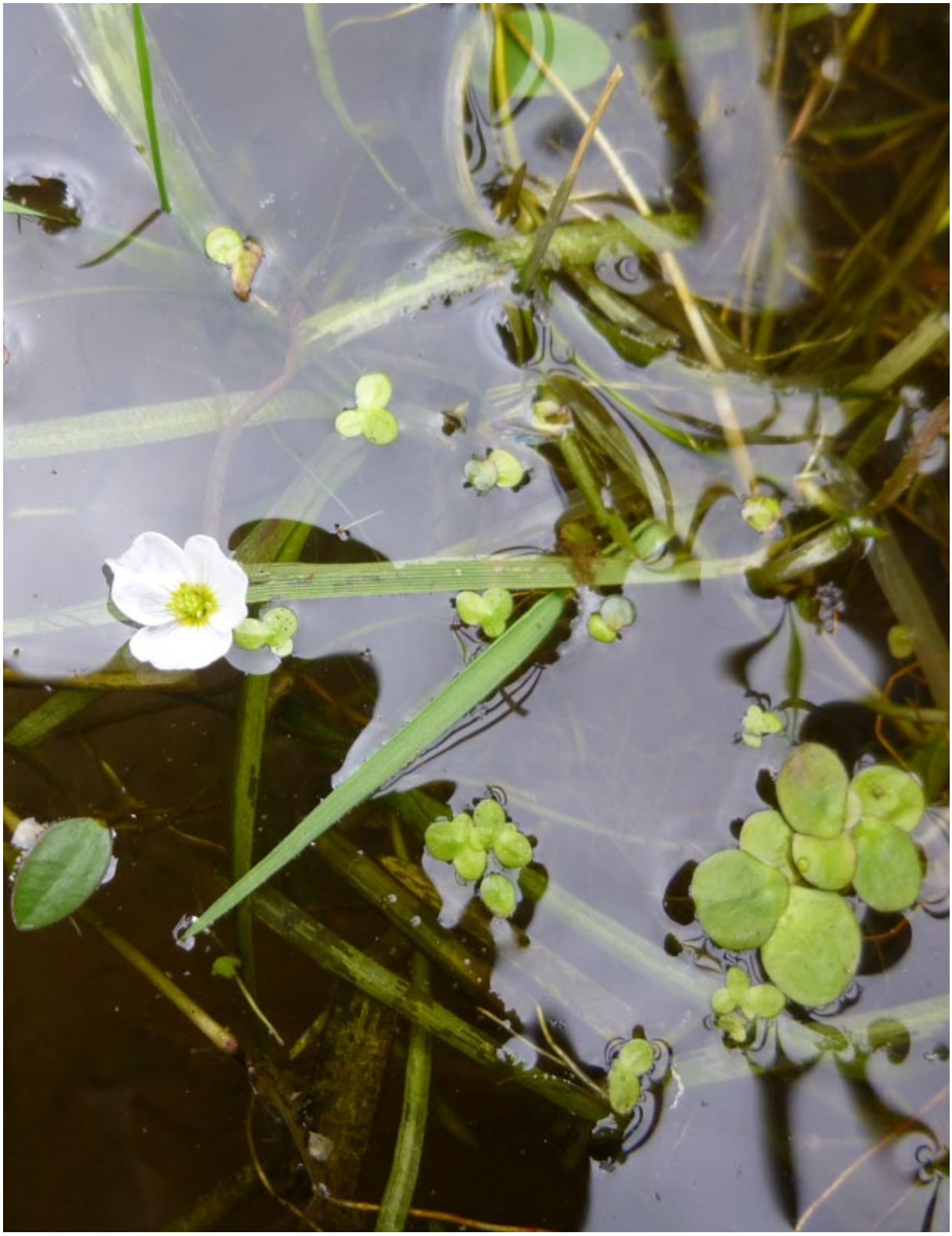
Shropshire Botanical Society

Newsletter

Spring 2023



Shropshire Botanical Society Newsletter No. 46

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Past copies of the newsletter are available as pdfs from the Shropshire Botanical Society website: http://www.shropshirebotany.org.uk

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Contents

Society News – notes from the Editor
Andrew Perry 3

History of the Shropshire Botanical Society 'What I left out'
Sue Townsend 4

BSBI VCR40 Report 2022
Mags Cousins and John Martin 5

National Moss Day - October 21st 2023
Philippa Thompson and Martin Godfrey 9

Montgomery Canal: a waterway in trouble?
Mark Duffell 10

Shropshire Wildlife Trust
Richard Grindle CEO 28

Rare Plants in Shropshire
John Handley 29

Obituary - Sylvia Kingsbury
Sue Townsend 33

Obituary - Pirkko Lisa Higson, 1937 – 2022
Ruth Dawes 33

A workshop on the genus *Bryum*
Martin Godfrey 34

Front Cover:

Floating Water-plantain *Luronium natans* near Pentreheylin Hall. (Photo Mark Duffell)

Our thanks to the Shropshire Wildlife Trust and the Field Studies Council for their generous support of our society. Both organisations support the work of the society in recognition of the importance of the contribution we make to understanding Shropshire botany.

Society News – notes from the Editor

Andrew Perry

It was great to see Shropshire and the West Midlands so well represented at the BSBI's England Annual Meeting in February, with talks from both Mark Duffell and Ian Trueman. If you were able to join you will have heard a sneak preview of a topic that Mark will be covering in more detail at our spring meeting on invasive species in Shropshire. Ian followed this with a talk about Sutton Park and the recently published flora that can be ordered online from: https://www.naturebureau.co.uk/the-flora-of-sutton-park-national-nature-reserve.

This March, the BSBI released the Plant Atlas 2020: "the most in-depth survey of the British and Irish flora ever undertaken. It builds on two previous plant distribution atlases published by the Botanical Society of Britain and Ireland in the twentieth century". It comes in the form of a two volume printed atlas with distribution maps, descriptions, phenology, altitudinal range, and time-series trends for some 2,700 native, alien, and hybrid species. There is also an excellent Plant Atlas 2020 website providing access to the data https://bsbi.org/plant-atlas-2020

For access to local data, our online database enables you to search for plant records in Shropshire; you can search for records at a given site name or grid square, or look at the records for a given species. The data search is quick and easy to use, and you can see the records displayed on a map. The website, which also works well on mobile phones and tablets, and can be found here: https://flora.shropshirebotany.org.uk/

Spring meeting

"*Does Shropshire have a problem with Invasive Non-native Species? A review of botanical data for the county*". Mark Duffell will be answering the above question on the 22nd April at FSC Preston Montford. This will be an extended version of the talk Mark delivered at the BSBI England Annual Meeting this year. We hope to hold another book sale and so any donations of unwanted natural history books are welcomed.

Field Meetings Programme 2023

Saturday 13th May. Benthall Edge Woods. Meet at 11:00 am in the car park at SJ657024, the National Trust car park (£3 for non-members). This will be a great time of year to see the wonderful woodland flowers. Eleven rare plants have been recorded here over the years but only three this century so there's plenty to look out for. We may even find Cinderella (*Hieracium cinderella* Long-bracted Hawkweed). For further information about the meeting please contact John Handley, 07507 054695, johnhandley11@gmail.com

Sunday 11th June. Llynclys Quarry. Meet at 11:00 am in the car park at SJ268242. This is inside the quarry. Take the small right off the main road then left just over the rail bridge. We will be visiting this wonderful quarry for the third time and at the same time as the Shropshire Spider Group. There are plenty of rarities to look for include the introduced *Schoenus nigricans* Black Bog-rush, and the only known Shropshire site for the hybrid between *Gymnadenia conopsea* Marsh Fragrant Orchid and *Dactylorhiza fuchsii* Common Spotted Orchid. For further information about the meeting please contact Andrew Perry, andrew.perrynt@gmail.com

Saturday 24th June. Dolgoch Quarry, an SWT Reserve. An abandoned quarry with a large variety of limestone flowers on the slopes and the floor of the quarry. Wooded area between the two grassland sites is also of interest. Rarities *Juncus subnodulosus* Blunt-flowered Rush and *Epipactis palustris* Marsh Helleborine have been recorded in the further quarry which also contains a large pool with a good amphibian population. Terrain is quite demanding through the wooded parts between the main grassland areas but it is not a large site. Meet 11.00 am. Parking in the layby just west of Llynclys crossroads on A 495. Care is needed; busy road, limited space. Car sharing advised. Cross the road and follow the track past the houses. Meet at the gate to the wood. SY10 8LN or SJ278242. What 3 words https://w3w.co/welfare.blurs.perfectly. For further information about the meeting

please contact Penny Wysome, 01952 242617, pennywysome@yahoo.com

Sunday 23th July. Nipstone Rock. Meet at 11:00 am in the car park at SO356970. There are three clubmosses to search for here, including *Lycopodium clavatum* Stag's-horn Clubmoss which is scarce in Shropshire and should still be present. Both *Huperzia selago* Fir Clubmoss and *Diphasiastrum alpinum* Alpine Clubmoss have recently been recorded here but only just hanging on. Are they still present? We need lots of eyes to get the best chance of finding all these three rarities. For further information about the meeting please contact Mags Cousins, 07873 532681, mags@bagbatch.co.uk

Saturday 26th August. Earl's Hill. Meet at 11:00 am in the car park at SJ409057. While we did visit just two years ago we are going again to record species that are best identified at this time of year. In particular *Dryopteris oreades* Mountain Male Fern, but also perhaps *Colchicum autumnalis* Meadow Saffron. The walk will have some steep climbs and spectacular views. For further information about the meeting please contact John Handley, 07507 054695, johnhandley11@gmail.com

Saturday 23th September. Whixall Moss Sphagnum Workshop. Meet at 11:00 am in the car park near the canal lift bridge at SJ493353. For further information about the meeting please contact Martin Godfrey, mfgodfrey49@gmail.com

Saturday 21st October. Long Mynd: National Moss day with hunt for rare mosses. Meet at 11:00 am in the small car park off the Burway at SO 437 942. We are celebrating National Moss Day with the British Bryological Society on their Centenary Year. In recognition of this we are seeking to re-find *Grimmia montana* Sun Grimmia, which is the only moss recorded in Shropshire in 1923 - the year the BBS was formed. It just happens that this is quite a rare species but with relatively good representation in Shropshire. Other Long Mynd rarities will also be searched for. For further information about the meeting please contact Martin Godfrey, mfgodfrey49@gmail.com

History of the Shropshire Botanical Society 'What I left out'

Sue Townsend

I was delighted that members got back to me to fill in some of the gaps in my knowledge of the evolution of our wonderful group. Special thanks to Pat Parker and Jane Ing for getting in touch. I glossed over a period of time when Charles Sinker and Ian Trueman led the way in the 1980s up until early 1990 when Sarah Whild took the reins. In these years it was the classes of Charles Sinker, held free of charge in Shrewsbury that inspired many, especially the Shrewsbury branch of the Shropshire Wildlife Trust. These folks continued to use their newly acquired knowledge to add more and more botanical records and write them down on the old fashioned and incredibly useful record cards. Ian Thompson was a key member of the group and Ian Trueman also gave freely of his time to help train people up to ensure reliable records. Those who got in touch with me were keen to make sure this period was mentioned when the society as a whole had achieved Flora 1, and Flora 2 had not yet begun. In my short article I mistakenly implied that little happened at this time. How wrong I was. It seems there was a hotbed of learning and recording plants. I am so very grateful for members' comments and would love to hear more. So if you have some old record cards, photographs or memories of times past - PLEASE let me know - any snippets gratefully received.

BSBI VCR40 Report 2022

Mags Cousins and John Martin

I am happy to report that John and I have survived our first year as the new joint County Recorders for VC40, Shropshire, having taken over from Sarah Whild and Alex Lockton in May 2022. It was all a bit intimidating but fortunately we have the support of the outgoing VCRs and help from the Shropshire Botanical Society with training, leading field meetings, recording and engaging with Shropshire botanists via the website Shropshire Botany.

One of the joint aims of the Shropshire Botanical Society and the Botanical Society of Britain and Ireland (BSBI) is to focus field meetings this year on re-finding rare plants that haven't been recorded in the county for a while. This is with a view to updating the Shropshire Rare Plant List, partly initiated by the drive from BSBI to update County Rare Plant Registers and the LORE project (LOst Rarities in England), see the article by John Handley "Rare Plants in Shropshire".

Inevitably since publication of the Rare Plants of Shropshire (Lockton and Whild, 2005) there have been changes, some very positive. Several species were declared extinct in 2005, but fortunately were re-discovered soon afterwards, e.g. *Hymenophyllum wilsonii* Wilson's Filmy Fern was found on the Long Mynd in 2005, probably at the exact same spot at New Pool Hollow, but after 20 blank years - understandable as it is quite hard to find amongst bryophytes (Fig. 1). The prize discovery must be *Potamogeton gramineus* Various-leaved Pondweed which Stephen O'Donnell found at Berrington Pool after an absence from the county of 129 years, the previous occurrence being Beckwith in 1885, at White Mere. Unfortunately, these good news stories are likely to be counterbalanced by the converse, with some rarities probably now extinct from the County, but only targeted searching will tell.

Marshalling the data is challenging, but thankfully iRecord is proving very handy as more and more Shropshire botanists are using it for submitting records (Fig. 2). Use of iRecord is ideal as John and I are able to quickly verify records submitted via this platform, especially if recorders submit photos of more uncertain or challenging species.

As recording years go, 2022 has been pretty good for the number of botanical records for VC40, perhaps something to do with the fine weather for those that could stand the heat. We have verified over 12,000 records via iRecord of 973 taxa, from about 300 different sites/locations and from a similar number of recorders, including well-established local botanists, new recorders and visitors to the county. We've even managed to make a few records of our own, especially John, who manages to combine recording plants, birds and invertebrates on a regular basis, and do a park run most weekends.

In addition to updating the Rare Plant Register for

Fig. 1 *Hymenophyllum wilsonii* Hook. Wilson's Filmy-fern with bryophytes on the Long Mynd, photo Mags Cousins

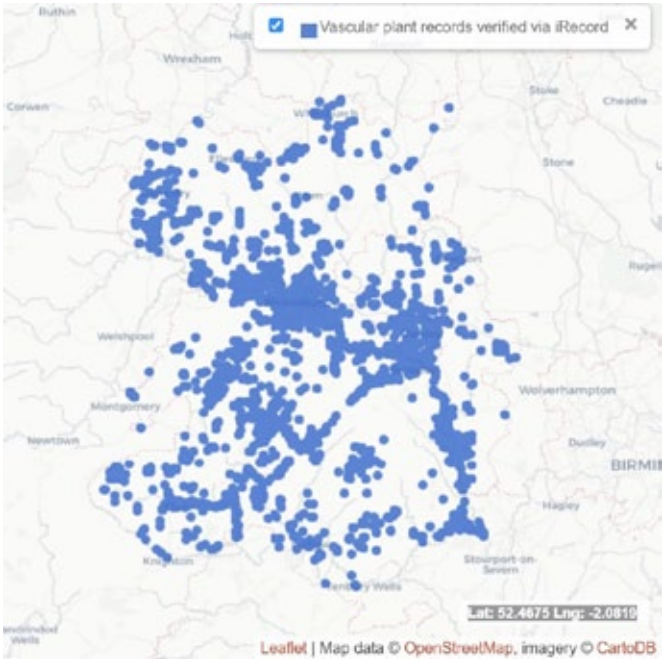

Fig. 2 Incidence of iRecord plant records for VC40, Shropshire

Fig. 3 *Centaurium pulchellum* (Sw.) Druce Lesser Centaury, photo Brett Westwood

VC40 we are always looking out for new county records, new squares and interesting finds, some of which are described below.

Centaurium pulchellum Lesser Centaury, (Fig. 3), was a new record for Shropshire, found by Brett Westwood on 3rd August, 2022. There were about 30 plants at the sides of a wide forest track in the Wyre Forest concentrated in an area of about one square metre. This location was within VC40 Shropshire by a few hundred metres only. Perhaps seed arrived on the wheels of forestry machinery that had been working at nearby sites in Worcestershire. It may well persist here as the niche is highly suitable being a dry, open, somewhat disturbed, grassy woodland ride.

A new county record that appears not to have persisted is *Euphorbia platyphyllos* Broad-leaved Spurge which Richard Pickering found in Ludlow, at SO50777445 at the base of a wall on 16th June 2021. Richard submitted the sighting last year via iRecord, with an excellent description and photos (Fig. 4): "Two plants growing at the base of a wall, adjacent to a pavement in quite harsh conditions on a street in Ludlow." It was confirmed by national referee for Euphorbias Timothy Walker: "I am confident that this is *Euphorbia platyphyllos*. I am basing this on the drawing in Stella Ross-Craig (1969) Drawings of British Plants. The warts on the ovaries are the best character to distinguish this from *E. stricta*." Stace (2019) describes these warts in *E. platyphyllos* as "capsules with hemispherical papillae glabrous to sparsely hairy" whereas in *E. stricta* "capsules with prominent cylindrical papillae, glabrous". Richard checked the location again in 2022 and *E. platyphyllos* was not present. Perhaps it has died out, but could be worth looking out for in case it has persisted somewhere nearby. It is an annual of cultivated and waste ground, usually growing on slightly calcareous clays, or sometimes lighter soils. It is declining in the south and east but perhaps this record in Shropshire will be followed by others, particularly if climate change is causing a shift in its range.

We seem to be accumulating more records of Euphorbias in Shropshire. Stephen O'Donnell recorded *Euphorbia dulcis* Sweet Spurge on 3rd July 2022 in Rectory Road, Donnington (Fig. 5), for which there is only one previous record in Shropshire from Old St. Chads Church in Shrewsbury in 2007 by Rob Stokes. Stephen's specimen was growing with *Borago pygmaea* Slender Borage (Fig. 6), itself a new record for VC40. There are only scattered records of this naturalised neophyte in the UK which was first recorded in the Channel Islands in the 1930s and

Fig. 4 *Euphorbia platyphyllos* L. Broad-leaved Spurge, photo Richard Pickering

Fig. 5 *Euphorbia dulcis* L. Sweet Spurge, Stephen O'Donnell's voucher specimen, photo Mags Cousins

Fig. 6 *Borago pygmaea* (DC.) Chater & Greuter Slender Borage, photo by Stephen O'Donnell

Fig. 7 *Carex divulsa* subsp. *divulsa* Stokes, Grey Sedge in Madeley, photo Kat Edwards-White

in Cornwall in the 1950s. Steve suspects the likely origin of both species to be the nearby Swallow Hayes garden, the owner of which, now deceased, was a plants woman and had the national collection of *Hamamelis* Witch Hazels.

Cesca Beamish has produced a new 10km square record for *Erigeron floribundus* Bilbao's Fleabane, discovered in Shifnal on 17th October 2022. This species is relatively new to the county, the first record being by Jonathan Shanklin in 2016 in Prees, followed by Shrewsbury in 2019 by Sarah Whild, then 2020 in Ludlow by Richard Pickering and again in Shrewsbury in 2021 by Dan Wrench. The five lobed disc flowers of the corolla and stiff, bent-forward hairs on leaf margin are characteristics to look out for on this species.

Carex divulsa subsp. *divulsa* Grey Sedge (Fig. 7), was recorded by both Mark Duffell and Kat Edwards-White this year; by Mark from Pole's Coppice near Pontesbury, not far from where he has recorded it before in 2008, and by Kat on 31st July 2022, from the Pit Mound at Hills Lane, Madeley, SJ70110430 which is a new 10km square for this sedge. It is a rarity in Shropshire at the edge of its range, although it is relatively common in southern England.

Limosella aquatica Mudwort (Fig. 8) continues to be found regularly at Venus Pool. This Shropshire rare species was declared extinct until being spotted at Venus Pool in 2006, ending an absence lasting 44 years. Previously, most records were from the Severn valley, but only Vicki Howden has recorded it near the River Severn in recent times (2018), prior to that was last seen in 1962 by

Fig. 8 *Limosella aquatica* L. Mudwort at Venus Pool, photo John Martin

Charles Sinker near the river.

Mark Duffell visited the Melverley area on 17th September 2022 and found a large patch of *Eleocharis acicularis* Needle Spike-rush growing by the River Severn at Crew Green, SJ33061572, on the Shropshire side of the river (Fig. 9). There was a dense stand stretching about twelve metres along the river, comprising probably thousands of individuals, the main associate being *Persicaria hydropiper* Water-pepper. River levels were low last year exposing plenty of mud and if this happens again this year it is well worth looking out for *Limosella aquatica*, *Eleocharis acicularis* and other species of the drawdown zone.

Another Shropshire rare species spotted in 2022 was *Littorella uniflora* Shoreweed, in its usual spot on the drying muddy edges of a small wetland up Nover's Hill, the Long Mynd. It was seen along with several other axiophytes such as *Helosciadium inundatum* Lesser Marshwort during a Shropshire Botanical Society outing, joint with the Wildflower Society on 7th August 2022.

Daniel Foy found 60 plus flowering spikes of *Neottia nidus-avis* Bird's-nest Orchid, at Limekiln Wood, on 25th June, 2022. These woods are a well-

Fig. 9 *Eleocharis acicularis* (L.) Roem. & Schult. Needle Spike-rush growing by the River Severn, photo Mark Duffell.

Fig. 10 *Neottia nidus-avis* (L.) Rich., Bird's-nest Orchid on Benthall Edge, photo Nick Swankie

Fig. 11 *Lathyrus nissolia* L. Grass Vetchling, photo Mags Cousins

known location for the species but even so, this is the first record from there for seven years. There was another record on 12th May from Benthall Edge by Nick Swankie (Fig. 10), again a well-known site, in an area now suffering from *Hymenoscyphus fraxineus* Ash dieback. It remains to be seen what effect this disease has on the woodland canopy and knock on effects on the ground flora. *Neottia nidus-avis* is a mycorrhizal saprophytic species of shady broadleaved woodland on calcareous soils.

Always a delight to see is *Lathyrus nissolia* Grass Vetchling (Fig. 11), which is perhaps continuing its spread. It was recorded twice in June 2022, first by Chris Hogarth in Wellington and by Emily Holmes near Ironbridge Gorge, in flower at both locations. It is considered native in southern Britain and a rare casual elsewhere and there are sporadic records from Shropshire, with increasing frequency from the first record in 1905, again in 1985, then 1991, 1994 and then in most years since 2004. Perhaps it will no longer be considered a Shropshire rare species once the records are analysed.

To help set you up for another productive summer of botanizing I will be running an online introductory session on iRecord on Sunday 30th April. Contact me: Mags Cousins (VCR 40, BSBI) mags@bagbatch.co.uk

References

Lockton, A.J. and Whild, S.J. 2005 Rare Plants of Shropshire, 3rd Edition, Shropshire Botanical Society.

Stace, C. 2019 New Flora of the British Isles, Fourth Edition, C & M Floristics.

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National Moss Day - October 21st 2023

Philippa Thompson and Martin Godfrey

The British Bryological Society celebrates its 100th birthday this year. A range of events in partnership with other organisations will be taking place around Britain and Ireland on or around October 21st. Details will be posted closer to the time, on the BBS website www.britishbryologicalsociety.org.uk

Beginner events, exhibitions and moss trails are being planned. It is hoped that some groups might be inspired to celebrate National Moss Day with artwork inspired by the world of mosses and liverworts. If you feel that you could contribute in any way, we would love to hear about it. Please contact Philippa Thompson at meetings@britishbryologicalsociety.org.uk

The BBS are also holding a photography competition. No need for specialist knowledge, just get out and photograph your local mosses and liverworts. Winning entries will be included in a bryophyte calendar for 2024. It is hoped that world of mosses and liverworts will inspire your creativity. The closing date is June 30th. For further details visit www.britishbryologicalsociety.org.uk

The Shropshire Botanical Society will be holding a Field Trip later in the year to try and re-find the one moss species recorded 100 years ago in Shropshire, *Grimmia montana*. See the field meetings programme for details.

Montgomery Canal: a waterway in trouble?

Mark Duffell

"But to me it seems quite clear. That it's all just a little bit of history repeating" Propellerheads featuring Shirley Bassey. 1997.

Growing up near to the Macclesfield Canal in Cheshire, my regular childhood dog walk would take me along its banks, other family walks led me past the roving bridge and on into the countryside. As a young naturalist I was constantly on the lookout for wildlife but the canal's chocolate brown waters were more reminiscent of Charlie and the Chocolate factory than crystal clear streams. I would garner only the briefest glimpse of a fish as it rose to the surface before darting back to the stygian depths. A memorable moment was watching a mink slinking along the opposite bank, plopping into the water, and swimming on down the canal completely unabashed by my presence, now in adulthood I know this was an unwelcome invader but it still fired my interest.

On a family outing to Cromford Mill, south of Matlock in Derbyshire, I was introduced to the Cromford Canal, a wonder to my young eyes, showing me what a canal can look like. Here was a linear 'aquarium' teeming with life, where pondweeds waved in the gentle current, and schools of fish could be seen gliding amongst the lettuce-like submerged leaves of Yellow Waterlilies. Occasionally to my delight I would spot a large Pike lurking with its sinister toothy grin. I dreamt of snorkelling along, floating above the flora and fauna, to me as exotic and wonderful as any tropical reef.

Imagine my joy when my family settled in Shropshire and I was introduced to the Montgomery Canal, finding a similar aquatic paradise to Cromford Canal right on my doorstep. With my training in botany came further visits with botanists such as Sarah Whild, confirming that this was indeed a special place. Even now I pop by any chance I get, whether on my own or with students in tow, and one of my happy memories of last summer is popping by the canal at Glan Hafren and Garthmyl to check on the *Luronium natans* Floating Water-plantain en-route to fieldwork elsewhere in Wales.

Where is the Montgomery Canal?

The Montgomery Canal branches off from the Llangollen Canal north-east of Oswestry at Frankton, heading south-west through England and over the border on to Newtown in Wales. Various sections of this route are navigable to powered boats, including the section from Frankton to Maesbury Marsh (re-opened to motorised boat traffic in 2003). Currently there are two large sections that are un-navigable, south of Maesbury through to Arddleen, and Berriew to Montgomery.

Why is the Montgomery Canal so special and what protection does it have?

To quote from the Canal and River Trust website (CRT 2023) "Wildlife thrives along the Montgomery Canal. It's one of the most important canals in the country for nature, much of it is a Site of Special Scientific Interest and the Welsh section is of international importance, designated a Special Area of Conservation for its aquatic plants", further on the website it states "the 'Monty'… is the best location in the world for floating water plantain'.

Two sections of the canal are designated as Sites of Special Scientific Interest (SSSI), with an English SSSI between Keeper's Bridge to Aston Bottom Locks and the whole of the Welsh section (NE 2023a, NRW 2023). The Montgomery Canal in Wales is also designated as a Special Area of Conservation (SAC), habitats selected by the European Commission and formally designated by the UK government. The SAC was selected for *Luronium natans*, of which the Montgomeryshire population is the largest and most extensive in the British Isles. It is also an important site for *Lutra lutra* Otter and various invertebrates (JNCC 2023a).

The Montgomery Canal is known nationally for its population and assemblages of submerged macrophytes (aquatic plants growing in or near water). The basis for the SSSI designation for the English section (Aston Locks to Keeper's Bridge) states:

"A disused length of canal which is among the best

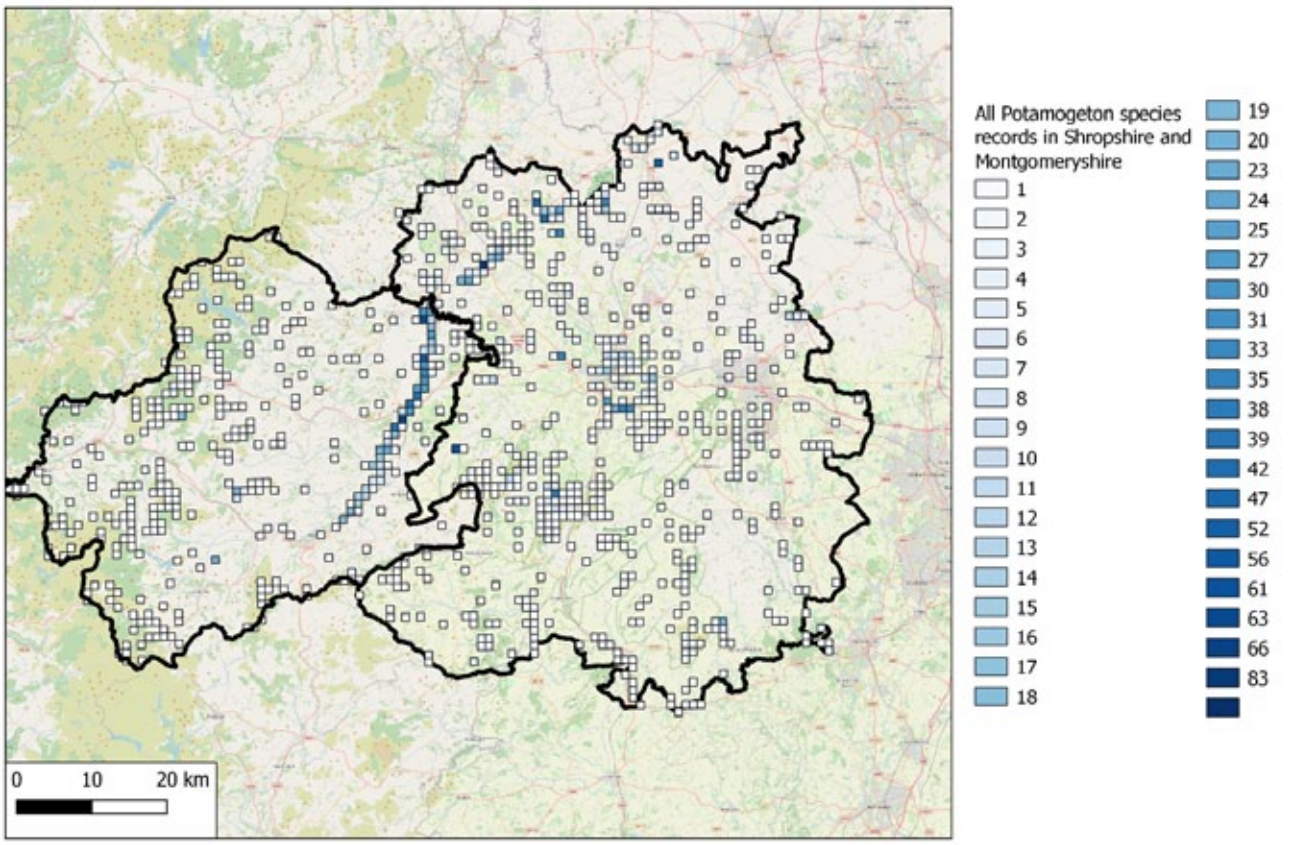

Figure 1: Map of all records of *Potamogeton* Pondweed species for Shropshire and Montgomeryshire at Monad scale. Darker squares indicate more than one record (see key). Source: QGIS 2023, Open Street Map 2023.

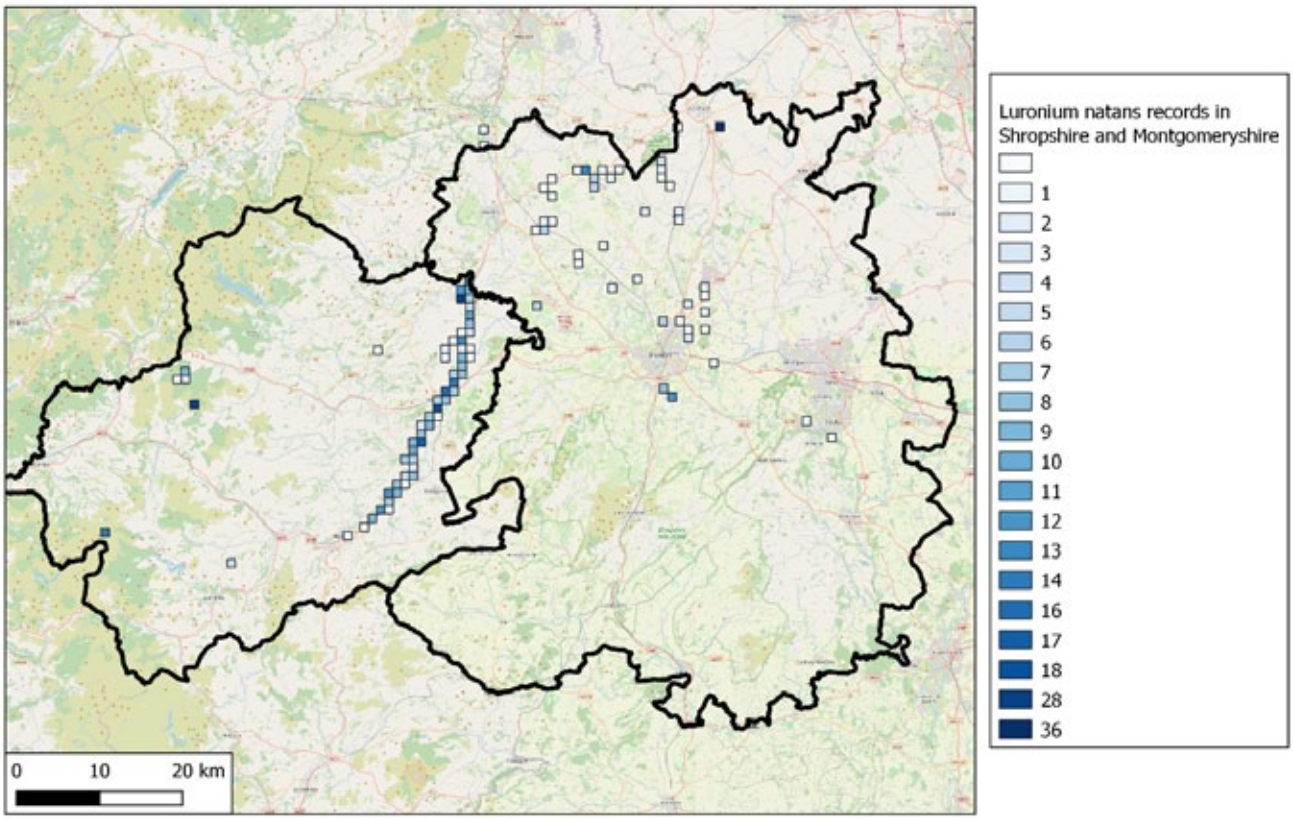

Figure 2: Map of all records of *Luronium natans* Floating Water-plantain for Shropshire and Montgomeryshire at Monad scale. Darker squares indicate more than one record (see key). Source: QGIS 2023, Open Street Map 2023.

localities for aquatic plants in Shropshire. The site is also of importance in demonstrating aspects of the succession from open water to reedswamp and fen. The Shropshire length of the canal is considered to be complementary to a section in Powys."

"This section of the canal is also considered to be a complementary site to the Meres of North Shropshire. It is richer in submerged and floating aquatic plants, and contains some species which were formerly recorded in the meres, but are no longer found in them."

"There are extensive areas of open water, with a range of submerged aquatic plants, including fan-leaved water-crowfoot *Ranunculus circinatus* and six species of pondweeds; curled pondweed *Potamogeton crispus*, red pond-weed *P. alpinus*, perfoliate pondweed *P. perfoliatus*, small pondweed *P. berchtoldii*, grass-wrack pondweed *P. compressus* and fennel pondweed *P. pectinatus*. Water-violet *Hottonia palustris* is locally common, and floating water-plantain *Luronium natans*, a rare species, has been found in recent years [It goes on to describe the floating aquatic plant communities, as well as the marginal vegetation].". NE 2023a.

The Welsh designations states:

"The Montgomery Canal is of special interest because it supports aquatic, emergent and marginal plant communities of exceptional richness, including a large population of the internationally rare and threatened floating water plantain *Luronium natans* and several other rare and scarce water plants. An important aquatic invertebrate assemblage is also present. The Canal is situated in East Montgomeryshire and extends from Llanymynech at the border with England to Freestone Locks near Newtown. An eastern section of the Guilsfield Arm is also included within the site, as are several off-line canal nature reserves."

"The aquatic plant communities of the canal are unusually species-rich. The submerged vegetation is characterised by pondweeds *Potamogeton* spp., including perfoliate pondweed *P. perfoliatus* and lesser pondweed *P. pusillus* and the nationally scarce grass-wrack pondweed *P. compressus*. Other notable aquatic plant species include autumnal water-starwort *Callitriche hermaphroditica*, flat-stalked pondweed *Potamogeton friesii* and long-stalked pondweed *P. praelongus*, which are rare in mid Wales. Floating plants are prominent locally, including yellow water-lily *Nuphar lutea* and various species of duckweed *Lemna* spp. The locally rare greater duckweed *Spirodela polyrhiza* occurs in places and floating water plantain is found along the entire length of the canal in Wales. [It goes on to describe further vegetation present as well as the importance of the rare dragonfly and damselfly species present].". NRW 2023.

These designations paint a picture of an aquatic paradise, the special interest due to the Montgomery Canal supporting this assemblage of aquatic, emergent and marginal plant communities of exceptional richness, including a large population of the internationally rare and threatened *Luronium natans* and several other rare and scarce water plants (Appendix 1). An important aquatic invertebrate assemblage is also present.

One of the reasons for the rich diversity in flora and aquatic fauna (particularly Dragonflies and Damselflies) in the past is the low nutrient status of the water (and thus high water quality), open areas of water, slow moving water and its limited disturbance (but enough to ensure coarse vegetation does not take over).

The importance of the Montgomery Canal to Montgomeryshire and Shropshire as sites for both *Luronium natans* and *Potamogeton* species, even set against the aquatic landscape of the Shropshire Meres is clear. Maps of these two taxonomic groups clearly indicate the route of the Montgomery Canal (Figures 1 and 2).

Specialist aquatic species

If we look at the site designations, they list a profusion of *Potamogeton* Pondweed species, as well as numerous other interesting aquatic macrophytes (Appendix 1).

Firstly, we have ***Luronium natans***, (one of the features of the SAC), a delightful monotypic genus within the *Alismataceae* Water-plantain family. It can be found producing stoloniferous carpets of long narrow leaves, which when conditions are right are joined by emergent floating oval leaves, and the bright white flowers 12-18mm across. It can be challenging to identify when only vegetative, especially with its ability to change leaf shape/form, making it sometimes almost indistinguishable from other related and unrelated aquatic macrophytes.

Vyrnwy Aqueduct looking south taken in 2004. Clumps of *Carex paniculata* Greater Tussock-sedge can be seen along the banks. The dominant floating macrophyte visible is *Potamogeton natans* Common Pondweed, with *Spirodela polyrhiza* Greater Duckweed intermingling. No *Hydrocharis morsus-ranae* Frogbit is visible in this view. As is typical of photos it is not possible to appreciate the diversity, or lack of underneath water (photo Alex Lockton).

Carreghofa Locks (south of Llanymynech) with significant drop in water levels during drought of summer 2022. Browned off emergent vegetation includes *Sparganium erectum* Branched Bur-reed and *Butomus umbellatus* Flowering Rush. *Hydrocharis morsus-ranae* Frogbit and *Potamogeton natans* Common Pondweed are present on the surface, underneath was occasional patches of *Myriophyllum alterniflorum* Alternate Water-milfoil and *Callitriche* sp. Water-starwort (photo Mark Duffell).

Luronium is endemic to north-western Europe, with Wales being the edge of their range in the west. It is considered to be declining in many parts of its range (Willby and Eaton 2003; Preston 2003). In the UK *L. natans* is protected under Schedule 8 of the Wildlife and Countryside Act, 1981 (as amended 1992), requiring a licence obtained from the relevant government bodies to handle or uproot plants. It is listed under Appendix 1 of the Bern Convention and Annex IV of the European Commission Habitats Directive and is of international importance (JNCC 2023c) for its conservation and rarity status (see Appendix 1).

In Great Britain and Wales, it is listed as of Least Concern (in part due to large populations in the Montgomery Canal), it is Near Threatened in England (Stroh *et al.* 2023).

Stroh *et al.* (2014) state that *L. natans* has a decline in its geographical spread in England of 33%, no such figures are available for Wales, but reviewing BSBI data (BSBI Data 2023) shows that the number of sites with recent (post 2000) records has reduced in Wales (Figures 3 and 4), although its population in Montgomeryshire is currently stable (Dr Kate Thorne, pers. comm.). Nationally it is showing a change of 84% since 1987 (Stroh *et al.* 2023).

L. natans can still be found in some Shropshire meres, especially Bomere Pool (2016 record), and it was present at Brown Moss (last record 2006). At the latter, trials by Natural England with sediment removal intended to help stimulate germination from the seed bank have been unsuccessful (pers. comm. Mags Cousins). However, *L. natans* is *Extinct* in the Shropshire section of the Montgomery Canal (last recorded in 1993 by Pat Parker near Welsh Frankton – BSBI Data 2023). It is still widespread in the Welsh sections of the Montgomery Canal, having recent records for many locations.

Figure 3: *Luronium natans* Floating Water-plantain - all records in British Isles (BSBI Database 2023)

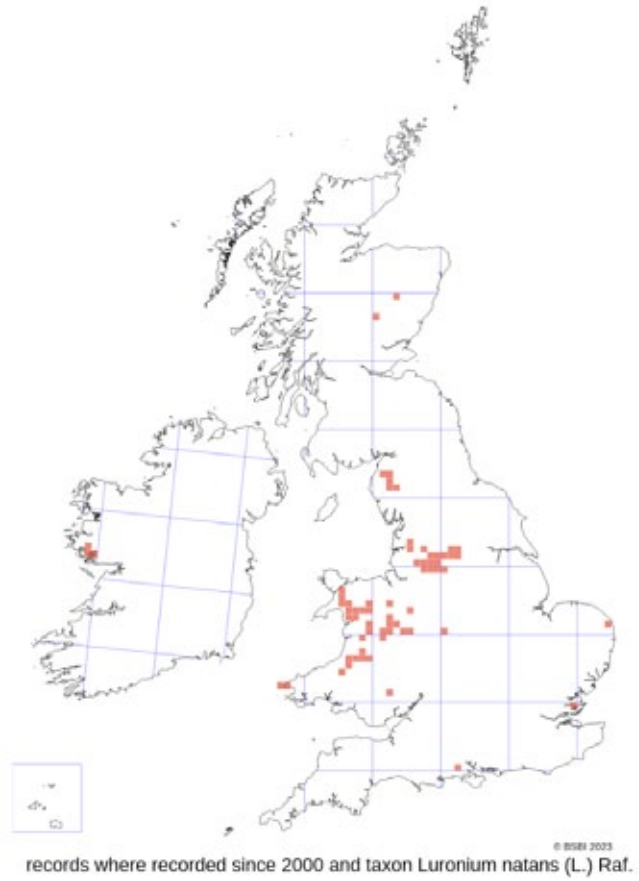

Figure 4: *Luronium natans* Floating Water-plantain - post 2000 records (BSBI Database 2023)

The *Potamogeton* Pondweeds species

Next up are a suite of *Potamogeton* species, many of which have extremely important conservation statuses. Within the confines of the Montgomery Canal, historically there have been 10 species of *Potamogeton* recorded, along with a very old record for the hybrid *P.* × *angustifolius* (*P. gramineus* × *P. lucens*) Long-leaved Pondweed by W.E. Beckwith in 1885. Of the other species only *P. trichoides* Hairlike Pondweed has only ever been recorded

once, in 2001 by C. Newbold in Welshpool. All other species have generally been widely recorded along both the Shropshire and Welsh sections.

***P. alpinus* Red Pondweed** is a dramatic species with beautiful, almost translucent, leaves having reddish tints. It was formerly widespread across the north and west of the British Isles, with patchy distribution in the south and east, occurring in slow moving water in lakes, rivers and canals. In Great Britain it is listed as Least Concern, Vulnerable in England, and Critically Endangered in Wales (Stroh *et al.* 2023). It has had a dramatic reduction in population (Figures 5 and 6), with the last Shropshire record in 2012. It was last recorded within the main Montgomery Canal in 2012 by Sarah Whild at Heath House (SJ3527), although it is unknown if this was a fragment or a large stand. It still occurs at one remote upland Montgomeryshire site (Carno 2022). During the restoration of the Shropshire section of the Montgomery Canal, plants of this species were moved into several offline reserves including Aston Locks off-line reserves, its last record there was in 2005 when Alex Lockton, Nick Stewart and Sarah Whild all recorded it there. In the Rare Plant Atlas (Lockton and Whild 2005) they noted that in **2004**: "A fair sized patch at the outflow from the reserve". **2005**: "A sizeable clump around the back of the reserve, but apparently gone this year from the vicinity of the outflow, where it has been until recently". I was fortunate to be in a group viewing it in 2005 and since then I have looked both on my own and with students and have not re-found it.

It is likely that this species is extinct in Shropshire, and only extant in one upland site in Montgomeryshire. "Red Pondweed is not present on the Welsh lengths of the Montgomery Canal, so the loss of this species from the Shropshire parts is particularly significant." (Lockton and Whild 2005).

***P. friesii* Flat-stalked Pondweed** is another species of slow moving rivers, streams and canals, with a generally lowland distribution that has declined dramatically across its range (Figures 7 and 8). It is listed as near threatened in Great Britain and Wales, and vulnerable in England (Stroh *et al.* 2023). In Wales it only occurs in Montgomeryshire, and there only in the Montgomery Canal. The last record was in 2001 when C. Newbold recorded it near Buttington

Figure 5: *Potamogeton alpinus* Red Pondweed – all records in British Isles (BSBI Database 2023)

Figure 6: *Potamogeton alpinus* Red Pondweed – post 2000 records (BSBI Database 2023)

Cross (BSBI data). In Shropshire it was last recorded in the Newport Canal at Newport in 2021 by Mags Cousins (pers. comm.), and it was last recorded in the Shropshire sections of the Montgomery canal in 2002 when Lockton and Whild found it at Queen's Head.

"Trina Paskell listed *P. friesii* as one of the species she saw in the Prees Branch Canal in the 1970s, but following restoration in the 1980s it has disappeared" (Lockton and Whild 2005).

"It has never been recorded on any of the other canals again either, with the sole exception of the Montgomery Canal… around Maesbury Marsh. Here it was seen… between 1985 and 1987, and again by Richard Lansdown in 1998. We (Whild and Lockton) found it to be abundant for a short distance upstream and downstream of Maesbury Marsh in 2000, but that stretch was drained in 2002 to prepare for restoration, and *Potamogeton friesii* has not been recorded in Shropshire since." (Lockton and Whild 2005).

It is only extant in Newport Canal, Shropshire, which is not navigable, and it is likely this species is extinct in the Shropshire and Montgomeryshire sections of the Montgomery canal.

***P. compressus* Grass-wrack Pondweed** is a Nationally Scarce species (endangered in Great Britain and England, Vulnerable in Wales (Stroh *et al.* 2023) which occurs in rivers, lakes and canals, largely in Great Britain. It is thought to have a restricted distribution globally, being known only in temperate regions of Europe and western Asia (Lockton and Whild 1998). The Montgomery Canal is noted as being especially important for this species (BSBI 2023). The conservation of the species in the Montgomery Canal is clearly a priority, but in its natural habitat in active river systems the species is virtually extinct (in former times it grew in oxbows, floodplain lakes and backwaters, from which it spread to mill ponds and then canals). "The restoration of such semi-natural habitats should be seen as the only valid conservation measure in the long term" (Lockton and Whild 1998).

Lockton and Whild (1998) have known this species from the Montgomery canal for many years and noted it is "still abundant in parts of the Montgomery Canal, particularly in Wales. The Vyrnwy Aqueduct was visited by Dr Preston [An international expert on Potamogeton] in 1998,

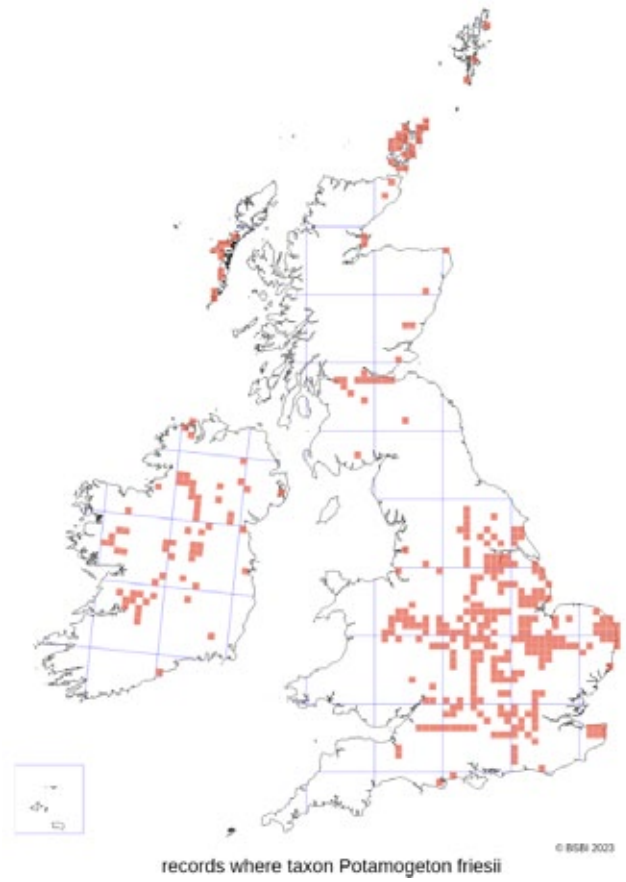

Figure 7: *Potamogeton friesii* Flat-stalked Pondweed – all records in British Isles (BSBI Database 2023)

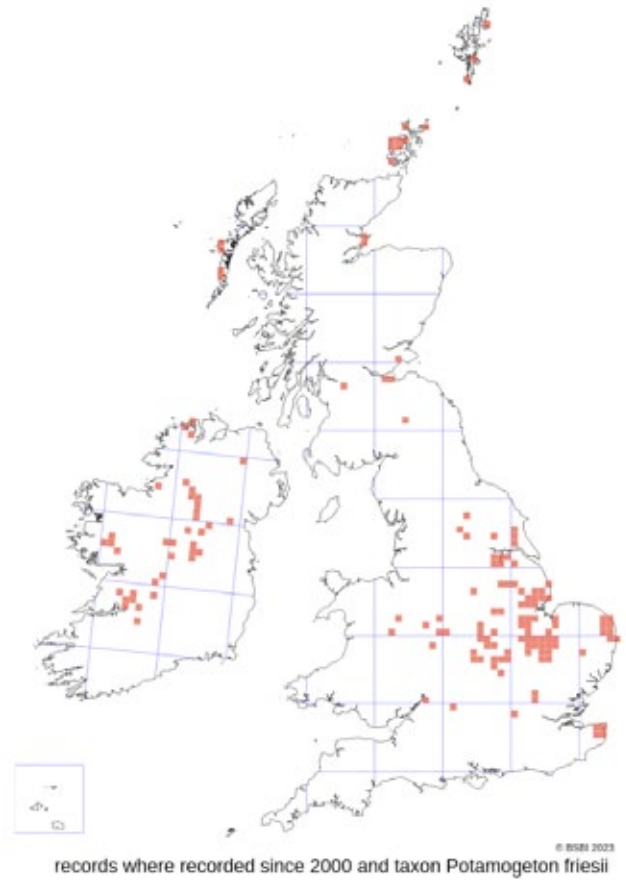

Figure 8: *Potamogeton friesii* Flat-stalked Pondweed – post 2000 records (BSBI Database 2023)

who commented that the population there was far greater than he had seen elsewhere in Britain…. During a survey by Whild Associates in 1997-98, it was identified in 26 out of 55 1km lengths of the canal. Just one of those sites was on the Shropshire part of the canal, and the population was small. The Welsh parts of the canal, however, contain the most significant population in Britain and, if the number of individual plants were counted, it may well turn out that there is more Grass-wrack Pondweed in the Montgomery Canal than in all sites in the rest of the British Isles".

"*P. compressus* spreads from core populations through water to new sites... Only three core populations are documented so far – the Montgomery Canal in Wales, the Ashton Canal in central Manchester, and the Ornamental Arm at Shugborough. The nearby water bodies for all three seem entirely unsuitable, so there is little opportunity for spread". (Lockton and Whild 2000).

"The Vyrnwy Aqueduct in Montgomeryshire. This canal contains about 90% of the British population of *Potamogeton compressus* but is subject to a planned restoration project that would enable motorised boats to use it. Off-line reserves and translocation have been proven not to work, so the *P. compressus* is almost certainly doomed. The only other significant site for this species in Britain is the Grantham Canal, which is also being restored." (Lockton 2002).

Sadly, the most recent record for *P. compressus* in Shropshire was in 2002 when Lockton and Whild recorded it at Queen's Head "One plant at the base of the eastern bridge at Queen's Head" and Aston Locks "One plant near the keeper's cottage at Aston Locks". Plants translocated to the offline reserves have apparently not survived.

I strongly recollect being shown it by Sarah Whild in 2005 at the Vyrnwy Aqueduct on an aquatic plants course where it formed dense waving mats of 'seaweed' like growth, with a glossy almost oily appearance where it touched the water's surface, particular along the aqueduct section where thousands of plants must have been visible. Sadly, there has been a dramatic decline in the population here, in part due to the recent blocking of the aqueduct with a bund at each end. The management around this area has also changed and since 2010 I have not seen plants at this location.

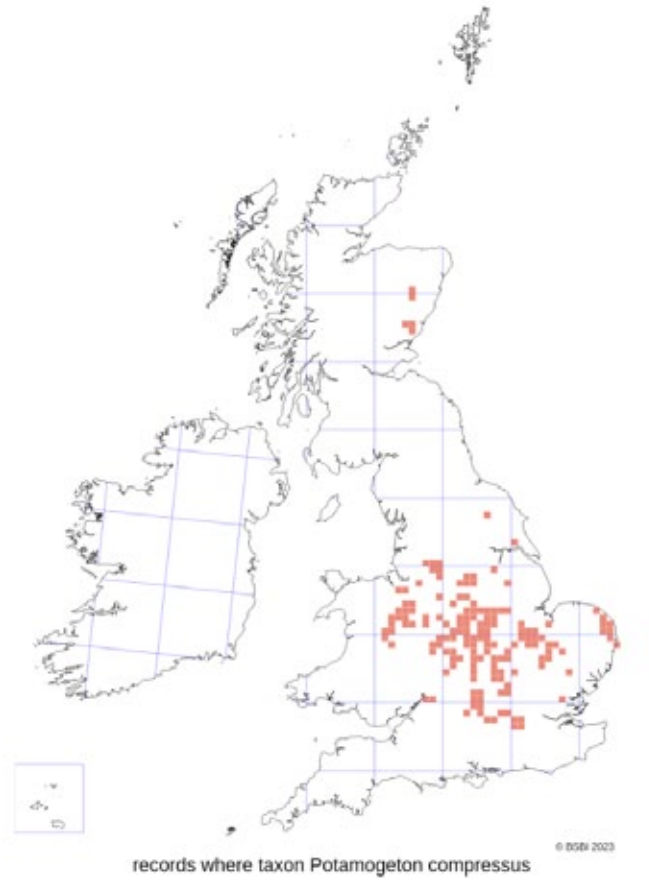

Figure 9: *Potamogeton compressus* Grass-wrack Pondweed – all records in British Isles (BSBI Database 2023)

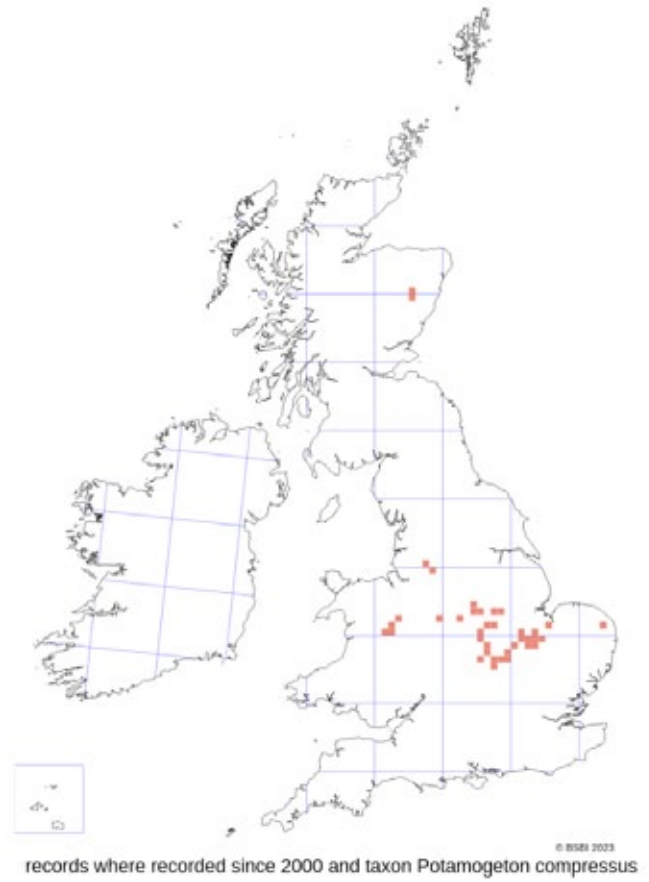

Figure 10: *Potamogeton compressus* Grass-wrack Pondweed – post 2000 records (BSBI Database 2023)

It is likely that this species is extinct in Shropshire, but widespread along unrestored but managed sections of the canal in Montgomeryshire (e.g. Brithdir 2022).

A review of botanical recording for *P. compressus* in the canals of Shropshire and Montgomeryshire is given in Table 1, showing its most recent records across the counties.

***P. praelongus* Long-stalked Pondweed** is a large, graceful species and when seen in-situ it makes an imposing sight. In Great Britain it is listed as Near Threatened, in England Endangered and Wales as Critically Endangered (Stroh *et al*. 2023). It can be found in substantial numbers along sections of the canal between Llanymynech and Vyrnwy Aqueduct. It occurs in rivers, lakes and canals in the British Isles and in Shropshire it occurred in many Meres, as well as historically in canals (Prees Branch until 1967, Newport canal in 1995 – potentially from an introduction when the canal was restored in the 1970s). The 2015 Flora (Lockton and Whild) considered it "probably extinct in the county now". Surprisingly in 2018 the author recorded it from below Aston Locks when a small clump of plants was spotted whilst canoeing along this stretch.

***Callitriche hermaphroditica* Autumnal Water-starwort.** This unusual macrophyte included on the Welsh SSSI/SAC citation (NRW 2023) forms neat clumps of bright green foliage, and used to be seen in profusion at the Vyrnwy Aqueduct. It is Least Concern in Great Britain and England, but Vulnerable in Wales (Stroh *et al* 2023). In Shropshire it was once more widespread in the Meres, and there are post 2010 records for Cole Mere, Crose Mere and White Mere (BSBI Database 2023). It used to also occur in various canals of the county, but the last record from any canal was in 2001 when C. Newbold recorded it at Aston Locks, although Lockton and Whild (2015) consider this record unconfirmed. It is probably extinct in the Shropshire sections of the Montgomery Canal. In Montgomeryshire it is listed as Scarce and a species of conservation concern (Thorne 2020).

Shropshire sections of the Montgomery Canal:
Many other species of macrophytes and emergent plants are included on the SSSI designations (Appendix 2), but it is clear that many of the aquatic macrophytes have suffered declines or are now extinct. The current conservation condition status for this SSSI is listed as 'unfavourable – no change' (NE 2023b). So, what has gone so terribly wrong, that what was formerly a thriving aquatic community, has declined so severely that the site has little of the conservation value and importance it once contained?

Location	Section	Last record	Navigable?
Montgomery Canal (Welsh sections)	Brithdir	2022	No
	Buttington	2016	Yes (?)
	Welshpool	2022	Yes
	Vyrnwy Aqueduct	2006	No
Montgomery Canal (English sections)	Aston Locks	2002	Yes
	Frankton locks	2002	Yes
	Maesbury Marsh	2002	Yes
	Queen's Head	2005	Yes
	Redwith	1958	Yes
Llangollen Canal	Ellesmere	1955	Yes
Shropshire Union Canal	Prees Branch	1978	No but very little open water due to lack of management
	Welshampton	1949	Yes
	Whixall Moss	1956	Yes
Newport Canal	Never present	-	No
Old Whitchurch Canal	-	1950	Yes

Table 1: Overview of recording of *Potamogeton compressus* Grass-wrack Pondweed in canals of Shropshire and Montgomeryshire, with notes on whether they are navigable to powered boats.

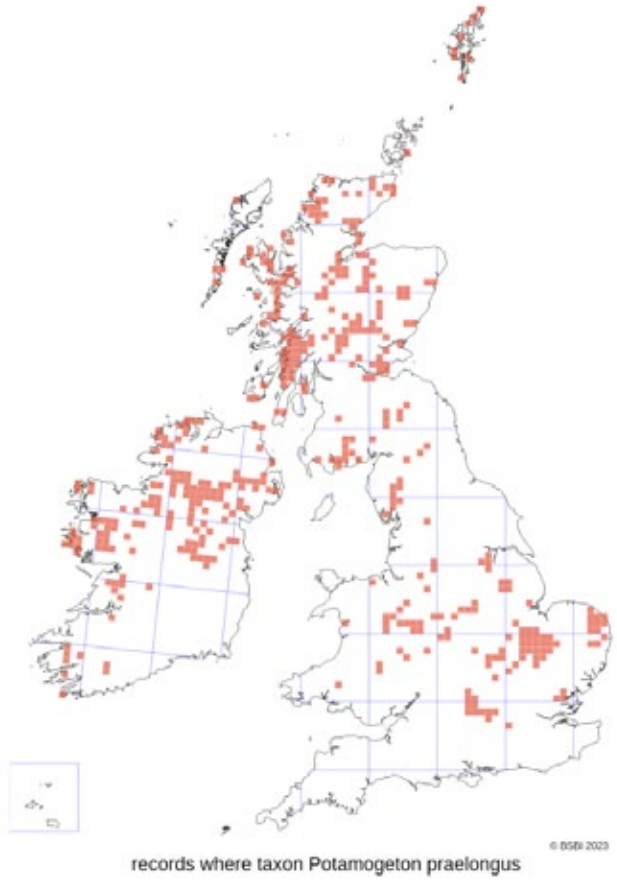

Figure 11: *Potamogeton praelongus* Long-stalked Pondweed - all records in British Isles (BSBI Database 2023)

Figure 12: *Potamogeton praelongus* Long-stalked Pondweed - post 2000 records (BSBI Database 2023)

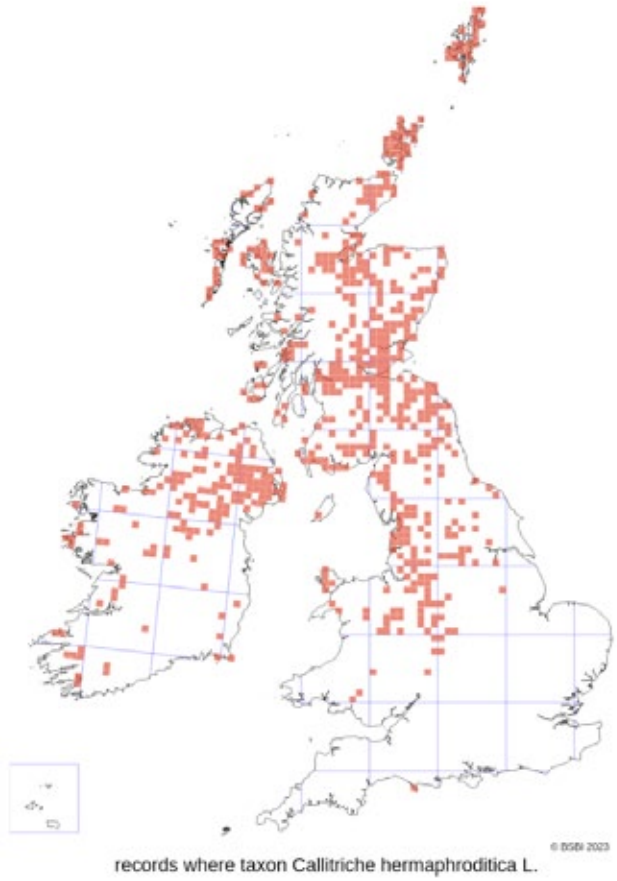

Figure 13: *Callitriche hermaphroditica* Autumnal Water-Starwort - all records in British Isles (BSBI Database 2023)

Figure 14: *Callitriche hermaphroditica* Autumnal Water-Starwort - post 2000 records (BSBI Database 2023)

The answer in short is *restoration of the canal to become navigable to powered boats in 2003*. Whilst initially the primary purpose of canals was to move goods by boat, originally these would have been horse drawn barges. Now with the introduction of powered canal boats, many canals have seen a dramatic decline in the vegetation (particularly submerged) both in number of species present and quantities (Murphy *et al.* 1995, Sagerman *et al.* 2020).

Self-propelled boats produce several threats; propeller disturbance, speed of boat and their wake and the number of boat movements. All of these add up to a major reduction in water clarity (turbidity) (British Waterways 2006). The propellers churn the water, disturbing silt and maintaining it in the water column, where it either remains or slowly settles on the submerged leaves of macrophytes, in both cases smothering them and reducing light levels. The passage of boats (even under correct speed limits) can also create a substantial bow wave, with a heave and sucking of the water column, again disturbing any sediments, and uprooting and damaging macrophytes.

This is why it is often possible to see species like *Nuphar lutea* Yellow Water-lily with their floating leaves able to grow in an active navigable canal, whilst many of the totally submerged species decline or disappear entirely.

These problems were known about well in advance of the re-opening of the Shropshire section, and a solution was put in place to mitigate some or all of these problems. One was to limit the number of boat movements, "Actual numbers of boat movements permitted in any section of the Canal will depend on maintaining the conservation value of the canal. They will be allowed up to the maximum level consistent with maintaining the nature conservation value of the canal". Initially the number of 500 annual boat movements was suggested from research from Murphy and Eaton (1983); this was over-ruled with a much larger allowance of 2,500 movements annually in Wales and 5000 annually in England. As we will see later, this has had a deleterious effect (Mags Cousins pers. comms.)

A cautious approach was also proposed but not adopted to boat movements with "small and steady increases towards a dynamic balance" to "allow detailed proposals on management and monitoring to be proven before being fully implemented" and "navigation levels will build up only on successful establishment of the reserves and careful monitoring and will start lower than the target levels" (Montgomery Canal Partnership 2005, IWAC 2007b). Sadly, whilst it might be clear that monitoring of the number of movements has taken place, it is clear that any of the levels required to maintain the conservation value of the canal have been far exceeded.

Another solution was the creation of various off-line reserves and these were instrumental in obtaining planning agreement for restoration (IWAC 2007a). Willby and Eaton (1996) found that in the short-term, offline reserves can support rich plant and invertebrate communities like those in the main channel, although in the longer term they may have a higher diversity of other species they lose the populations of the critical submerged plants that they were originally created for (Boedeltje *et al*. 2001). Problems occurring with offline reserves include (IWAC 2007a):

"Water Quality: if the water entering the reserve, either from the surrounding land or from navigation in the main channel, is silt-laden and turbid, then the reserve may silt up quickly.

"Vegetation succession: silting-up can allow tall emergent vegetation extensively to colonise the compensation area, out-competing the submerged and floating-leaved plants which are typically the main reason for establishing the reserve."

"Management: due to emergent plant and tree/shrub encroachment, sites need to be managed to maintain open water habitat equivalent to that originally present in the pre-restoration navigation channel. This has long-term cost implications."

One of the hopes was that the offline reserves would form 'seed-banks' for threatened species to re-colonise and supplement the populations in the main canal arm, although the effectiveness of this has been disputed.

In the Montgomery Canal the most well known offline reserve is at Aston Locks, a series of interconnected pools mimicking a canal. Unfortunately, this was butyl lined rather than constructed from clay or stone, making maintenance (dredging etc.) difficult to impossible. Briggs (2006) discusses some of the other offline reserves (including Rednal, Guilsfield Arm)

and concludes that 'it was soon apparent that the reserves were mostly too small, and more susceptible than the canal to overgrowth if neglected', commenting at the time that British Waterways did not have the resources to manage the pilot reserves, as it 'could barely manage the canal'.

New offline reserves were created in 2018 below the previous Aston Locks reserve, these total (3 ha) and consist of a mixture of a huge 'lake' and some interconnected channels (CRT 2017).

As has been noted above (and shown in Appendix 3) many of the important species planted into the off-line reserve have since been lost, either because it is an unsuitable habitat or due management issues or water quality. Other issues can be from pollution incidents from individual canal barges including oils or grey water.

Briggs (2006) lists several issues with the 1990s restoration, these can be summarised as:

- Lack of management of the pilot reserves.
- New offline reserves. Initially considered part of the restoration package, later treated as extras rather than essential.
- Poor channel design. New sections of canal were needed in Shropshire to replace damaged sections, these missed the opportunity to further enhance biodiversity.

In other canals such as the Rochdale Canal which also has a significant population of *Luronium natans,* dual channels were created, allowing areas to be relatively undisturbed by boating, but this technique cannot be applied to the Monty as it is too narrow and has a more complex biodiversity (Briggs 2006).

The impacts of boat movements on individual macrophytes can be dramatic with an exponential fall in population numbers due to increasing levels of boating (Eaton and Willby 2002, Montgomery Canal Partnership 2005). It is horrifying how quickly a species can have its population reduced and eventually lost e.g., for *L. natans* 50% of the non-navigable population would be lost with only 500 annual boat movements (Table 2).

The proposed figure for boat movements by Canal and River Trust is to work towards a figure of 2,500 annual boat movements (Montgomery Canal Partnership 2005), along with uncontrolled boat speed, this figure is incompatible with the desired aim to retain the submerged macrophytes within the main canal body.

Table 2: Species densities of seven aquatic macrophytes, expressed as percentage of density at zero boat movements (Eaton and Willby 2002.

	Annual Boat Movements			
Plant Species	500	1000	2000	4000
Luronium natans	50	32	18	1
Potamogeton compressus	80	63	44	28
Potamogeton praelongus	69	48	28	16
Potamogeton friesii	212	273	329	322
Potamogeton alpinus	58	42	29	19
Hydrocharis morsus-ranae	86	71	53	38
Callitriche hermaphroditica	52	32	16	7

The Canal and River Trust have recognised the value and potential of horse-drawn boats through sensitive areas such as the Vyrnwy Aqueduct (Montgomery Canal Partnership 2003); until recently you could enjoy a horse-drawn cruises from Maesbury Marsh to Aston Locks.

The state of the Shropshire sections of the Montgomery Canal is best summarised by Lockton and Whild in their 2015 Flora:

"The Montgomery Canal is still a pleasant walk, but it no longer has the wonderful diversity of aquatic plants that made it such a notable site in the past."

"A short distance south along the canal is the Aston Locks reserve, one of a series of 'offline nature reserves' which were created to offset the damage done by the restoration of the canal to navigation. These offline reserves were effectively ponds, and they seem to have failed to preserve many of the plants they were supposed to protect, such as Floating Water-plantain (*Luronium natans*), Grass-wrack Pondweed (*Potamogeton compressus*) and Red Pondweed (*P. alpinus*)."

"If you want to see these species now, you have to go over the border to the Welsh sections of the canal, which have not yet been opened to motorised traffic. The problem is that the propellers on canal boats stir up sediment, making the water completely opaque. Solutions that would work include somehow towing the boats along important stretches or creating reserves that are exactly like canals, complete with a gentle flow. "

In the 2005 'Rare Plants of Shropshire' Lockton and Whild discuss *L. natans* and canals stating:

"A good case can be made for *Luronium natans* to be Britain's most important plant from the point of view of nature conservation. It is rare and threatened globally, being restricted to north-western Europe and in decline throughout its range. It is also a good habitat indicator, growing in clear, unpolluted waters".

"Restoration of canals for motorised boat traffic has been a disaster for conservation, even with the construction of off-line reserves and pools, which have failed to sustain populations of Luronium. The last record of it in a canal in Shropshire was in 1994, when British Waterway staff 'rescued' it from Aston Locks prior to conservation. Given clear water, there is every chance it could return, and it is still abundant in the Welsh sections of the Montgomery Canal, but even low levels of boat traffic seem to have an immediate and devastating effect".

"The only… recent site for it was in the Montgomery Canal at Llanymynech in 1986, but it has now gone from the Shropshire lengths of the canal." (Lockton and Whild 2015).

So, what about the Welsh sections of the Montgomery Canal?

Until fairly recently (c. 2010 – see note below*) the section of the canal at Vyrnwy Aqueduct had crystal clear water and little 'weedy' vegetation, presence of rare submerged botanical species (all indicators of low nutrient status), with a reasonable flow, and periodic clearance of coarse marginal vegetation to ensure areas of open water. This has ensured the survival of many of the threatened and rare submerged aquatic plants mentioned above.

*A local problem has been the leak at the Vyrnwy Aqueduct, which had Canal and River Trust engineers bund either end and install a narrow pipe, then removing water from that section, which in 2023 totally dried out. The abundant populations of Grass-wrack Pondweed that once occurred here are apparently gone.

In contrast, visiting re-opened sections of the canal such as at Queen's Head or Aston Locks in England at the same time reveal the main canal section to be brown and opaque, with little light penetration beneath the surface. This results in there being little submerged aquatic plant life present, the only species in the open water being those with floating leaves (*Potamogeton natans* Broad-leaved Pondweed and *Nuphar lutea* Yellow Waterlily) which can sustain themselves with these light levels.

This decline in water quality is caused in part by boat movements churning up the sediment, and with many boat movements it exacerbates the problem (see other causes of decline above).

Many of the submerged aquatic plants require the following conditions:

- Gentle current
- Very clear water (low algae, silt, sediment content)
- Water chemistry with low nitrogen (and other chemical) status,
- Suitable substrate for plants to root into (avoiding 'sterile' lined canals).
- Availability of seeds and propagules from other sections to re-introduce back if a local population declines or gets lost (larger populations supplementing smaller populations in less optimal conditions nearby).

Mitigation to ensure species are not lost when canals are restored for navigation includes the construction of off-line reserves. In Shropshire these include the offline reserve at Aston Locks near Queen's Head, this has unfortunately been a failure.

Generally, the condition of the Montgomery Canal in Wales is in much better health, aside from some localised issues, in part caused by the devastating drought on the river Tanat which feeds the Montgomery Canal, meaning water levels and flow into the canal were much reduced in 2022.

All sections of the canal are suffering from increased nutrients (eutrophication) both from water flowing into the canal and from the atmospheric nitrogen. This can be seen especially on slower moving sections where the nutrients build up and encourage flushes of algae, duckweeds and coarser vegetation.

Trouble ahead?

There is a very active campaign by the Canal and River Trust to restore the whole of the remaining un-navigable sections of the Montgomery Canal to powered boats. Recently the Department for Levelling Up, Housing and Communities (2023) awarded almost £14 million to restore navigation

to the canal (between Llanymynech to Arddleen).

Most conservationists agree that the canal needs ongoing maintenance, otherwise the coarser emergent vegetation such as *Glyceria maxima* Reed Sweet-grass will encroach and infill the open stretches of water forming impenetrable mats, in fact limited boat movements can help prevent this.

There are however strong concerns over the impacts of recreational boating, and the piecemeal re-opening of small sections of the canal do not always appear to take into account the impacts, after all there is always another bit to be restored which has the aquatic macrophytes still contained. But this does not take into account what happens when they restore the entirety of the canal, what is required is a current review of the whole canal system and its aquatic flora and fauna and the impacts of restoration.

Many species listed on the Welsh Red List as Least Concern or only low conservation threat/status are due to the populations within the Montgomery Canal being so large, removing these sites from the Welsh Populations would likely have a massive impact on the conservation statuses, changing for the worse.

A botanical best-outcome: is the answer in the solution?

If powered canal boating is to be restored then ways need to be found to limit the impacts that boating will have on the aquatic macrophytes and specialist invertebrates. It is obvious that water clarity is a major player in maintaining healthy populations of aquatic macrophytes. The vision should be for no long-term damage or net deterioration of the existing Welsh sections of the Montgomery canal, these can be achieved in part as follows:

Boat movements:

- Limit the number of boats - the current aim of 2500 annual movements appears to be in conflict with maintaining diversity and quality of flora and fauna in the canal system.
- Enforce speed of boat movements, utilising average speed cameras with strong enforcement (educate boat users on the reasons for speed restrictions).
- Introduce alternative methods of propulsion along sensitive areas e.g. Vyrnwy Aqueduct, horse-drawn or powered towline options?
- If monitoring of the aquatic macrophytes show that the conservation value of online/offline reserves are declining (e.g., through lack of management, excessive numbers of boat movements) then navigation will be reduced accordingly.

Online and Offline reserves:

- Create new sections of the canal for powered boats to bypass sensitive sections of the canal, with the original section acting as the reserve for the plants.
- Single file navigation to protect sensitive areas, with suitable barriers (and silt screens) and screens to limit boat movements and other recreational users.
- Creation of further additional offline reserves, that supplement, not replace online reserves (net gain of habitats).
- Re-open the canal in stages (this already happens due to intermittent funding), ensuring any restoration carefully conserves threatened/rare plants (ex-situ for a limited time if required). If works fail to conserve specific flora then cease work until systems are in place to ensure their viability.
- Allow at least five years since creation of offline reserves before allowing boating through adjoining restored sections, to allow any transplanted flora to become established.
- If new sections of canal are created then ensure they are designed not just for boating but also for ecology, allowing sufficient space between vegetation and boats etc.
- Allow sufficient funds for long term management of online and offline reserves including contingencies for further mitigation work if required.

Aquatic Plants:

- Active monitoring of important macrophyte species (*Luronium, Potamogeton* species and others) both in situ and transplanted populations, with clear targets and limits, that are able to predict/determine any decline in populations before serious declines occur (allowing for time lags and trends). Lansdown

(2022) has set out clear protocols for these species.

- Management of native invasive species such as *Stratiotes aloides* Water Soldier (native to the eastern side of England) and *Hydrocharis morsus-ranae* Frogbit (possibly a non-native strain introduced into the canal, Kate Thorne pers. comm.)
- Manage the marginal vegetation to ensure large areas of open water (in part achieved by semi-regular boat movements).
- When restoring the canal ensure that some silt etc. is retained for re-use as it will contain propagules of the extinct/rare/threatened species that could allow them to re-establish in the canal later (particularly useful in the poorer botanical sections of the canal network).

Additionally, we need to educate both the general public and canal users on why the biodiversity of the Montgomery Canal is unique and needs conserving.

Having reviewed much of the literature available on the previous work of restoring the canals, it is clear that the information on how to do this well has been available, but through changes in personnel the overall picture has been lost. Perhaps we need to go back to some of the original practitioners from the old British Waterways days such as Jonathan Briggs, as well as expert aquatic botanists such as Richard Lansdown and listen to their vast knowledge and expertise and finally put this knowledge into practice.

An argument can be made that the canal environment is artificial and that the plants have only settled in them having established from neighbouring waterbodies. But in our anthropogenically induced nature-deprived landscape, surely, we should be doing everything in our power to maintain these habitats at their maximum diversity? Elsewhere we are seeing the homogenisation of our landscape and its flora and fauna - do we want all our canals or rivers to have the same suite of coarse marginal aquatics without any of the botanical bright spots?

This is our rainforest, these are our pandas, we should stand up and fight to ensure the protection that past botanists and naturalists fought to get in place and by which any future work on the Monty is held to account. If you don't want to see a homogenised canal network, and ensure that nature is considered when the canal is restored, please consider signing this petition https://www.montwt.co.uk/montgomery-canal-campaign

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Appendix 1: Conservation and threat status for species discussed in this document (based on Thorne 2020, Stroh et al. 2023, JNCC 2023b).

Scientific name	GB Status (IUCN)	England (IUCN Status)	Wales Status (IUCN)	Schedule 8	National Status	Montgomeryshire Status	Shropshire Status	Notes
Butomus umbellatus	LC	LC	**VU**	-	**Scarce**	**Uncommon**	Local, stable.	
Callitriche hermaphroditica	LC	LC	**VU**	-	**Scarce**	**Scarce**	**Rare, decreasing**	
Luronium natans	LC	**NT**	LC (1)	Yes	**Scarce**	**Rare**	**Extinct** (in Montgomery Canal)	Welsh plants comprise 58% of GB population (Dines 2008). Declined in it GB geographical spread by 33% (Stroh et al. 2014).
Oenanthe fistulosa	VU	VU	LC	-	-	**Rare**	**Rare, decreasing**	
Potamogeton alpinus	LC	**VU**	**CR**	-	-	No records	**Rare, decreasing**	
Potamogeton berchtoldii	LC	LC	LC	-	-	Scarce	Scattered, stable	
Potamogeton compressus	**EN**	**EN**	**VU**	-	**Scarce**	**Uncommon**	**Extinct**	
Potamogeton crispus	LC	LC	LC	-	-	Uncommon	Local, stable.	
Potamogeton friesii	**NT**	**VU**	**NT**	-	-	**Rare**	**Rare, decreasing**	37% decline England
Potamogeton natans	LC	LC	LC	-	-	-	Local, stable.	
Potamogeton obtusifolius	LC	LC	LC	-	-	-	Scattered, stable.	
Potamogeton perfoliatus	LC	LC	LC	-	-	Scarce	**Local, decreasing**	
Potamogeton praelongus	NT	**EN**	**CR**	-	-	**Scarce**	**Rare, decreasing**	
Potamogeton pusillus	LC	LC	LC	-	-	Rare	Scattered, stable.	
Potamogeton trichoides	LC	LC	LC	-	-	-	Not recorded	One record in 2001 by C. Newbold in Welshpool.
Spirodela polyrhiza	LC	LC	LC	-	?	?	?	

Key: **Lower Risk Categories** LC = Least Concern, NT = Near Threatened, **Threatened Categories:** VU = Vulnerable, EN = Endangered, CR = Critically Endangered. **Extinct Categories EX** = Extinct

(1) Least concern because of huge population in Montgomery Canal (Wales).

Nationally Scarce: a plant recorded in 100 or fewer hectads (10 x 10 km squares). Potentially species is now Nationally Rare – new research needs undertaking.

Montgomeryshire Status: **Rare** - 1-3 sites in county. **Scarce** – 4-10 sites in county

Appendix 2: Species included in SSSI designation for English section of Montgomery Canal.

Common name	Scientific name	Status on site (with last record)	Note
Submerged aquatics			
Water Violet	*Hottonia palustris*	Present	One small patch (?) in reserve
Floating Water-plantain	*Luronium natans*	Extinct	International importance
Red Pondweed	*Potamogeton alpinus*	**Extinct (2005)**	
Small Pondweed	*Potamogeton berchtoldii*	**Extinct (1997)**	
Grass-wrack Pondweed	*Potamogeton compressus*	Extinct (2002)	National importance, Endangered
Curled Pondweed	*Potamogeton crispus*	**Present (2015)**	In offline reserve
Fennel Pondweed	*Potamogeton pectinatus*	Not present	
Perfoliate Pondweed	*Potamogeton perfoliatus*	Not present	
Fan-leaved Water Crowfoot	*Ranunculus circinatus*	**Extinct (2003)**	
Floating aquatics			
Frogbit	*Hydrocharis morsus-ranae*	Present	
Yellow Water Lily	*Nuphar lutea*	Present	
Broad-leaved Pondweed	*Potamogeton natans*	Present	
Unbranched Bur-reed	*Sparganium emersum*	Present	
Great Duckweed	*Spirodela polyrhiza*	Present	Locally rare
Marginal aquatics			
Flowering Rush	*Butomus umbellatus*	Present	Locally rare
Lesser Pond-sedge	*Carex acutiformis*	Present	
Greater Pond-sedge	*Carex riparia*	Present	
Reed Sweet-grass	*Glyceria maxima*	Present	
Yellow Flag	*Iris pseudacorus*	Present	
Branched Bur-reed	*Sparganium erectum*	Present	

Appendix 3: Records of Pondweeds *Potamogeton* species from Aston Locks and Queen's Head Canal and offline reserve (BSBI Database 2023)

Scientific Name	Common Name	Last record	IUCN Red listing
Potamogeton natans	Broad-leaved Pondweed	2022	Least concern
Potamogeton praelongus	Long-stalked Pondweed	2018	**Near Threatened**
Potamogeton crispus	Curled Pondweed	2015	Least concern
Potamogeton alpinus	Red Pondweed	2005	Least concern
Potamogeton pusillus	Lesser Pondweed	2005	Least concern
Potamogeton compressus	Grass-wrack Pondweed	2002	**Endangered**
Potamogeton friesii	Flat-stalked Pondweed	2002	**Near Threatened**
Potamogeton obtusifolius	Blunt-leaved Pondweed	1998	Least concern
Potamogeton berchtoldii	Small Pondweed	1997	Least concern

Shropshire Wildlife Trust

Richard Grindle CEO

I was delighted to be asked to write something for the Shropshire Botanical Society Newsletter. I joined Shropshire Wildlife Trust two years ago, having previously worked for London Wildlife Trust. Alas I am no botanist, but I am thoroughly enjoying learning on the job in Shropshire.

Last year Shropshire Wildlife Trust celebrated our sixtieth anniversary. From small beginnings we have grown into an organisation of nearly 50 employees, and – just as important – 300 volunteers. Our vision is of a thriving natural world where Shropshire's wildlife and natural habitats play a valued role in addressing the climate and ecological emergencies, and people are inspired and empowered to take action for nature. We have three goals:

- for 30% of land to be managed for nature by 2023 ('30 by 30'). This does not necessarily mean more nature reserves, or 'rewilding'; just as important is promoting nature's recovery as part of the wider farmed landscape.
- for one person in four to be taking action for nature - which might be volunteering, joining a campaign, or simply taking an interest in their local flora and fauna.
- for nature to play a role in addressing Shropshire's problems. This includes benefits such as carbon sequestration, natural flood management, and wellbeing.

We now have 40 nature reserves covering almost a thousand hectares of habitat ranging from lowland raised bog to moorland and from ancient woodland to hay meadow. We could not manage these reserves without the invaluable work of the volunteer monitoring group, many of whom are SBS members. In 2023 we will be working with the North West Rare Plant Initiative to learn more about some of the rare plants on our nature reserves.

Our nature reserves remain fundamental as sanctuaries for rare species and as exemplars of good conservation. But at least some of our reserves have the additional role of providing a welcoming space for people from every community get outdoors and experience something of nature. Balancing these aims can be a challenge, but they both matter.

We also recognise that there is a limit to how much land we can manage really well. If we are serious about '30 by 30' we need to do even more 'outside the fence', advising land managers and helping to restore and create habitat on land that we do not own or manage.

SWT is one of 46 Wildlife Trusts across the UK. We are locally accountable, but we work collectively to campaign for better national policies for nature's recovery. We also increasingly work at regional level and cross-border to increase our impact: the new Wilder Marches programme is a joint enterprise by Herefordshire, Montgomeryshire, Radnorshire and Shropshire Wildlife Trusts. And we are proud to work in partnership with a range of national and local conservation organisations, for example with Natural England and Natural Resources Wales on the BogLIFE project to restore Fenns, Whixall and Bettisfield Mosses.

Bluebells on Earl's Hill (Ben Osbourne)

Land management advice (credit SWT).

Rare Plants in Shropshire

John Handley

This article grew out of a small winter project and once this article has been published, I will upload the excel table that forms the basis for this article onto the Shropshire Botanical Society Website: https://www.shropshirebotany.org.uk.

Like many members of the Society I am indebted to both Dr Sarah Whild and Alex Lockton for their stewardship of the Society, for the work they have done to ensure access to the records that we can now view via the database (https://flora.shropshirebotany.org.uk) and for their publications such as The Flora and Vegetation of Shropshire (2015) and Rare Plants of Shropshire (2005). I also acknowledge their predecessors, Professor Ian Trueman and Charles Sinker amongst many others, who have greatly improved our understanding of the Shropshire flora.

The first edition of the Rare Plants of Shropshire was published by the Shrewsbury Museum Service in 1995, quickly followed by a second edition by Lockton, Whild, Trueman, Walker & Parker (1995). The third edition in 2005 (Lockton and Whild) is a detailed account which defines the criteria for inclusion as a Rare Plant, provides a short background to the most significant historic botanists in Shropshire. It discusses changes in the flora since the first rare plant records from the county were made in 1632, when George Bowles visited William Coote at Chirbury and they found *Impatiens noli-tangere* 'Codded Arsmart' (Touch-me-not Balsam) at Marrington Dingle and *Drosera anglica* Great Sundew in the extensive bogs south of The Mere, Ellesmere (Oswald 1985, 1995). Both were additions to the British list. The third edition discusses the best sites for rare plants within Shropshire illustrated with a coincidence map. There are also a few paragraphs on nature conservation before habitat indicator species for Shropshire are listed, which presumably was the forerunner of the Axiophyte concept. This has become an incredibly useful way of assessing the relative quality and value of sites that are important for nature conservation.

The detailed species accounts provide the scientific name (current at that time) and common names, followed by its status in the county and occasional reference to the New Atlas (Preston, Pearman and Dines, 2002). There is a description of its recorded history and distribution or status beyond Shropshire where this is useful. Species with more than a few sites were mapped using tetrad dot maps, with open circles for pre-1995 records and black dots for records from 1995.

I imagine that almost everyone in the Shropshire Botanical Society is familiar with the 3rd Edition of the Rare Plants of Shropshire. I pick my copy off the shelf at least once a year and you can download the Rare Plants of Shropshire 2005 from Shropshire Botanical Society Dropbox folder. We live in an era when information is so abundant that it is now more important to determine its accuracy and relevance than its availability. We are so used to being able to download, edit, upload and share data that its sole physical presence in a book can act as a limitation to its use. I am dismayed when I think of all the wonderful surveys that may have elucidated the ecology of a habitat, or site, that will never be read by an ecologist because they are locked away; particularly those surveys that were publicly funded.

I have created a spreadsheet of the species listed within the Rare Plants of Shropshire and updated the taxonomy to the version we are currently using, the fourth edition of The New Flora of the British Isles (Stace, 2019). This should hopefully prove useful for a project that the Shropshire Botanical Society are about to engage in.

The Botanical Society of Britain and Ireland have created the LORE project (LOst Rarities in England), https://bsbi.org/england-project, to encourage local societies to re-find rare plants that haven't been recorded in their county for a while. The launch of the Plant Atlas 2020 in March has identified some very concerning declines, and after the publication of the Shropshire Flora in 2015 we think it is a good time to focus some of the field meetings on re-finding rare plants in Shropshire.

Many of them have been relatively well recorded within the county which means we have accurate grid references for many of them. This project will

Taxon	Common name	Status (Lockton & Whild 2005)	Last recorded in Shropshire	Occurrence up till 2019 (BSBI DDb)
Baldellia ranunculoides	Lesser Water-plantain	Extinct	2005	121
Campanula glomerata	Clustered Bellflower	Extinct	1999	28
Carex montana	Soft-leaved Sedge	Scarce	2004	83
Cephalanthera longifolia	Narrow-leaved Helleborine	Extinct	1986	30
Cuscuta epithymum	Dodder	Extinct	1999	37
Marrubium vulgare	White Horehound	Rare	1997	81
Mentha pulegium	Pennyroyal	Extinct	2002	16
Myosurus minimus	Mousetail	Extinct	1970	4
Myrica gale	Bog-myrtle	Rare	2004	65
Valerianella dentata	Narrow-fruited Cornsalad	Rare	2000	48

A few examples of the 255 species that feature within Rare Plants of Shropshire (Lockton and Whild, 2005).

necessarily take us to lovely places and the variety of species to re-find will pose a challenge whatever your level of experience or botanical skill – there are several hybrid Orchids on the list, but there are also many other species that haven't been seen for a while and it would be useful to know if they are still there and how well they are faring such as the species listed above, just a few examples of the 255 species that features within the Rare Plants of Shropshire (Lockton and Whild, 2005).

A good place to start to re-find these rarities are the areas of high conservation value such as the Wildlife Trust reserves. We have scheduled three of the field meetings during 2023 to take place on Shropshire Wildlife Trust reserves. There will be general surveying with all plants being recorded but particular attention will be given to recording the presence and abundance of rare species.

- Saturday June 24th - Dolgoch Quarry.
- Sunday July 23rd - Nipstone Rock.
- Saturday August 26th - Earls Hill.

Dolgoch Quarry is the first of the three Wildlife Trust sites that we will be visiting. It is one of a string of abandoned limestone quarries in the north-west of the county. Details of the different species that we will be looking to re-find at Dolgoch Quarry make up the remainder of this article.

Calamagrostis epigejos Wood Small-reed

Calamagrostis epigejos was first recorded in the county in 1841 at Battlefield Church and has subsequently been recorded on 45 occasions since then. Although a common grass in the east of England, particularly in plantation forestry after it has been clear-felled, it is rare in Shropshire. It has most commonly been recorded within the county at Haughmond Hill, and was last recorded at Dolgoch Quarry by Dr Kate Thorne in 2006.

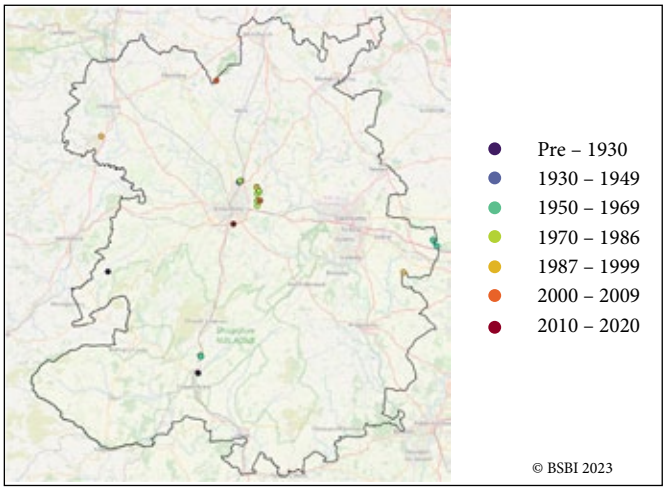

Fig 1.*Calamagrostis epigejos*

Carex lepidocarpa Long-stalked Yellow-sedge

Carex lepidocarpa, which some of us may be more familiar with as *C. viridula* ssp. *brachyrrhyncha*, occurs in lowland calcareous flushes and used to be one of three subspecies of *C. viridula* Yellow Sedge. *Carex demissa* Common Yellow-sedge (formerly *C. viridula* ssp. *oedocarpa*) occurs commonly in Shropshire in acid upland flushes, and *Carex viridula* Small-fruited Yellow-sedge occurs on the margins of neutral pools and is rare. *C. lepidocarpa*

was first recorded in the county by Charles Sinker at Crose Mere in 1960 and he also recorded it at Dolgoch quarry in 1966.

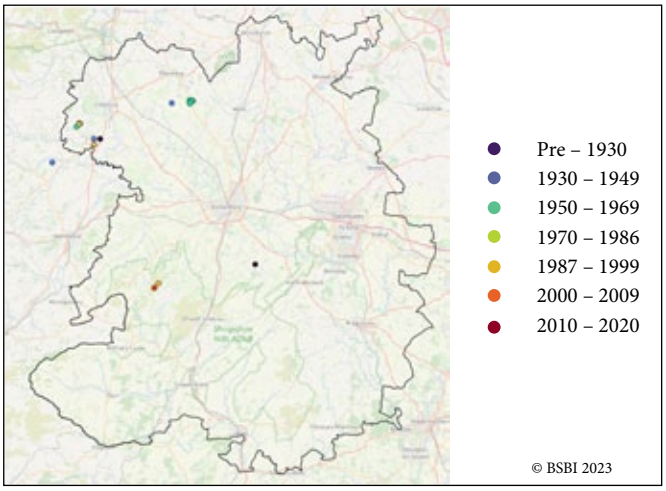

Fig 2 *Carex lepidocarpra*

Dactylorhiza purpurella Northern Marsh-orchid

This is on the very edge of its range in Shropshire, although it is a common species of wet pastures in the north and west of Britain. The first record for the county was in 1937 by Maurice Gepp recorded it in the Shelve area – probably at Black Marsh, near the headwaters of the West Onny. Charles Sinker recorded it at Dolgoch Quarry in 1966.

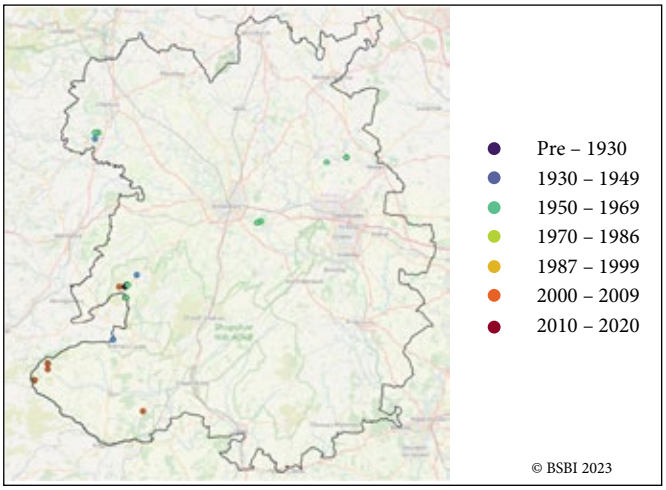

Fig 3 *Dactylorhiza purpurella*

Dactylorhiza viridis Frog Orchid

Whild and Lockton (2005) note that 'this species has suffered one of the most dramatic declines of any in Shropshire. Leighton (1841) described it as not uncommon, and listed 15 sites from Oswestry to Ludlow. It is a plant of dry, calcareous grassland, and it was once quite frequent along Wenlock Edge, but it appears to have been lost from there entirely. Edward Williams recorded it in meadows at Eaton Mascott and Battlefield in about 1800. Once again it was Charles Sinker who recorded it at Dolgoch Quarry in 1966.

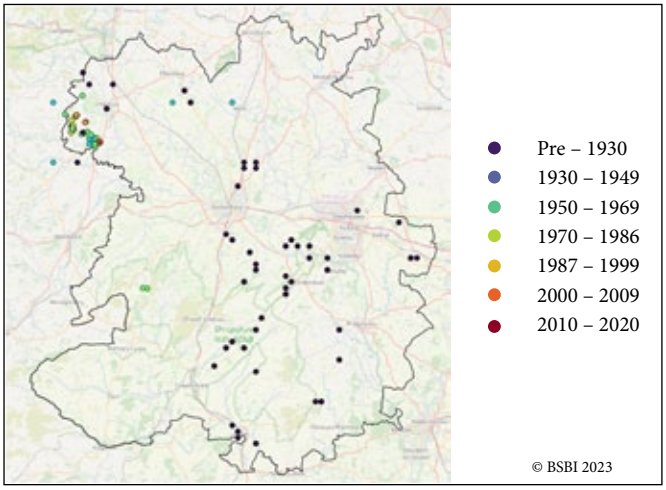

Fig 4 *Dactylorhiza viridis*

Epipactis palustris Marsh Helleborine

The first record of this species in Shropshire was in the 1720s, at Oakeley Wood to the east of Bishops Castle. Dr Kate Thorne recorded it at Dolgoch Quarry in 2016 as did John Clayfield, Mags Cousins and Dr Fox.

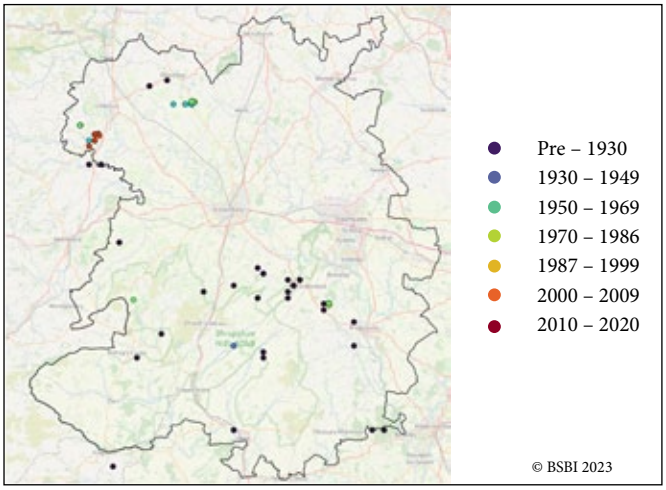

Fig 5 *Epipactis palustris*

Juncus subnodulosus Blunt-flowered Rush

J.E. Bowman recorded *Juncus subnodulosus* near the lime kiln at Cole Mere in 1841. It was first recorded at Dolgoch by Chris Walker in 1988 and also by Dr Sarah Whild in the same year. The latest record is by John Clayfield, Mags Cousins and Dr Fox in 2016.

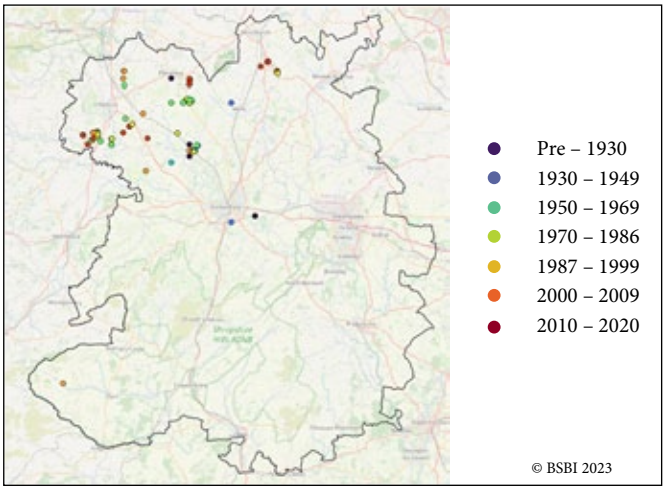

Fig 6 *Juncus subnodulosus*

Parnassia palustris **Grass-of-Parnassus**

This species is now reduced to just one site in the county, Trefonen Marshes. It is a plant of base-rich flushes in species-rich grassland and is indicative of some of the best wildlife habitats. It was first recorded at Knockin Heath by Arthur Aikin in 1796. It was last recorded at Dolgoch Quarry by Mary Hignett and Mary Asterley in 1945.

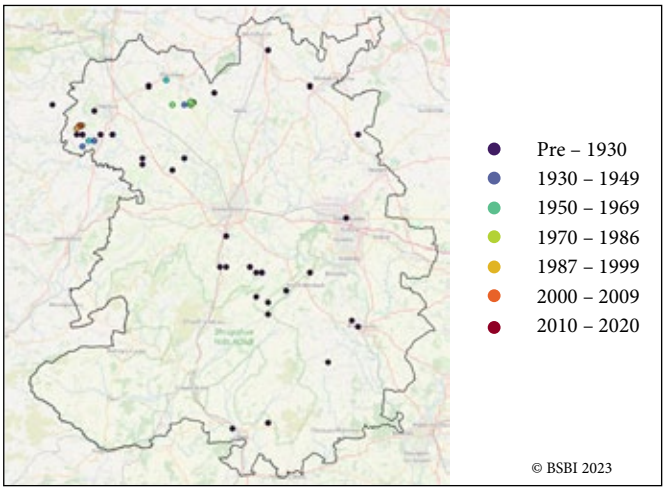

Fig 7 *Parnassia palustris*

Trollius europaeus **Globeflower**

Shropshire is on the edge of the range for this northerly, upland species, but in the past it was not uncommon in the north-west of the county. It was first recorded by Richard Hill Waring in 1770 at The Hayes, Oswestry and last recorded at Dolgoch Quarry in 1984 by Doris Pugh.

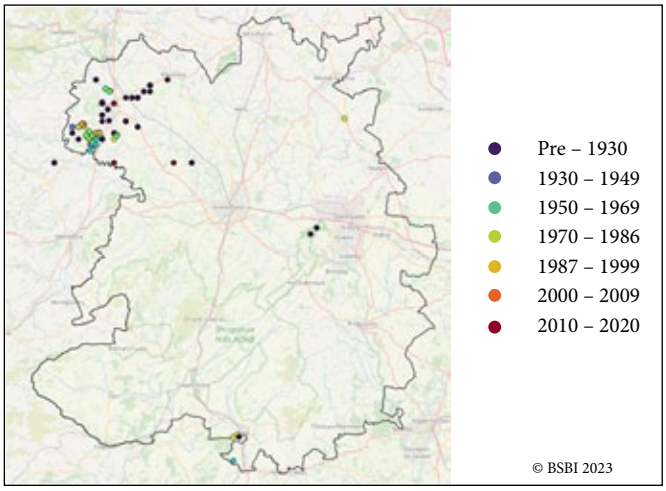

Fig 8 *Trollius europaeus*

We hope that you can join us for the start of, what is sure to be, an interesting and informative project.

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Obituary - Sylvia Kingsbury

Sue Townsend

Sylvia was a longstanding member of the botanical society with a keen interest in keeping records. She was part of the original 'mini flora' group who assembled to keep good records and encourage each other's accuracy under the guidance of both Charles Sinker and Ian Trueman. She was something of a pioneer, being employed as a virologist and actually discovered a new type of virus in the 1960s. Her natural history interests were very wide - she regularly submitted records of mosses and liverworts and was a member of the British Bryological Society. When I first met her back in the 1990's she had retired to Shropshire and her mobility wasn't what it was. In fact I only met her a few times at indoor meetings at Preston Montford where she attended with pleasure as she was, at that time, able to drive up from her home in Bishops Castle. She also had a keen interest in cecidology (the study of plant galls) and was an active member of the Plant Gall committee. She sadly died on Christmas Eve 2022 and I for one will miss knowing she is no longer there.

Obituary - Pirkko Lisa Higson, 1937 – 2022

Ruth Dawes

Pirkko was born in Finland, but I knew her, and her surviving husband Neil, as the owners and dedicated carers of some exceptionally fine limestone grassland in Nantmawr. She inherited her love of plants from her mother, a keen horticulturist. Despite having health setbacks, Pirkko and Neil opened their meadows in aid of Shropshire Wildlife Trust in the summer of 2022 on a spitefully showery day. Kind local friends provided assorted good cakes for refreshments, but the highlight was the well planned signed walk past groups of tall, sturdy *Ophrys apifera* Bee Orchids in numerous places. In some years flower numbers have been in three figures. Well, how often do you see that in "just a meadow"? There were other commoner orchids too and herbs, including *Clinopodium vulgare* Wild Basil and *Origanum vulgare* Wild Marjoram and lots of *Odontites vernus* Red Bartsia, plus butterflies. Periodic visits from grazing stock help to manage the meadows. Thankfully, her family have promised that Pirkko's legacy will be carried forward. Rest in peace, dear poetic friend.

A workshop on the genus *Bryum*

Martin Godfrey

Over the weekend of 20th-22nd January 2023 the FSC centre at Preston Montford hosted a workshop on the moss genus *Bryum* hosted by Dr David Holyoak, author of a recent monograph on the European species. The workshop was attended by 18 students and was largely lab based, supplemented by some fieldwork at Llanymynech quarry and stubble fields behind the Field Centre.

There are some 52 species of *Bryum* in the British flora which grow in a wide variety of habitats – from seashore saltmarshes to mountain rocks – and can be anything from extremely abundant, like the *Bryum capillare* below, to very rare and even endangered.

Fig. 1 – *Bryum capillare*

Two problems make the genus interesting, the first is the actual taxonomy which is in something of a flux. Although the British list keeps them all in the genus *Bryum* many taxonomists would split this into a series of segregate genera with just a few of the species in each of them, the monograph mentions five which are recognised in Europe – *Anomobryum, Bryum, Imbribryum, Ptychostomum* and *Rhodobryum* and which are used in the current European checklist. Luckily for us the current British checklist used *Bryum* for all except *Rhodobryum* which we have traditionally treated as a separate species. Dr Holyoak has got around this in his monograph by calling them all *Bryum* but putting the segregate genus name after it in brackets.

The second problem is rather more practical in that many species cannot be identified without examination of microscopic features which take some skill and practice to prepare (and may not even be present on the specimen). These features are: the peristome which regulates spore dispersal at the mouth of the ripe capsules; the perianth which has male and female reproductive organs rather like a flower (some species are monoicous and some dioicous); and tubers, which are underground asexual reproductive structures rather like minute potatoes on the moss rhizoids. Typically tuberous plants grow in stubble fields in the autumn and winter and there are a couple of these at the back of the field centre which are excellent for mosses which specialise in this habitat.

Our fieldwork involved finding and collecting specimens followed by lab sessions to learn to prepare microscope specimens so that we could identify species. Although a binocular microscope and a steady hand were needed to examine the perianths and prepare the peristomes, perhaps the most tricky were the tubers as the rhizoids from adjacent species usually grew together and it was hard to decide if the tubers were actually attached to the specimen you were trying to identify.

A big surprise for a group of us out collecting in a wheat stubble field for mosses with tubers was finding a rare *Bryum* which was also a new county record - *Bryum gemmilucens.* This moss grows in small tight rosettes on bare mud and is

Fig. 2 - *Bryum sauteri* tubers

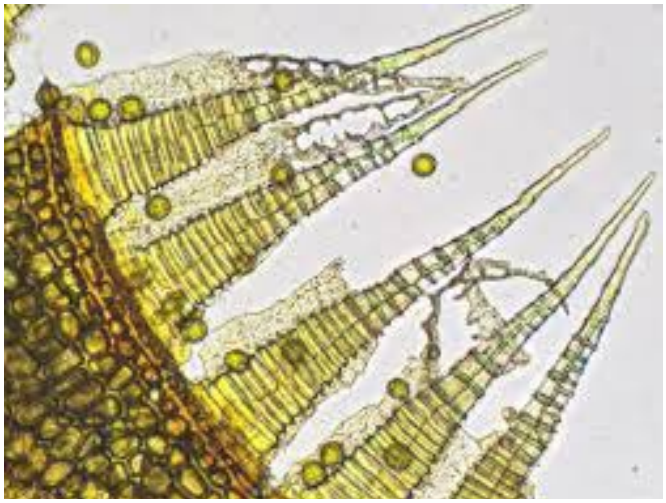

Fig.3 - A *Bryum* peristome

distinguished by having very small bulbils with tiny leaf primordia growing amongst its leaves. You have to be careful to distinguish it from other, much more common, species like *Bryum dichotomum* which grows in looser rosettes and has much bigger bulbils, however Dr Holyoak was able

Fig. 4 - *Bryum gemmilucens*

to confirm the identification.

After a lot of eyestrain over microscopes, and gin consumption from the Preston Montford bar, 18 students came away on Sunday afternoon having had a great time and learning a lot more about *Bryum*.

Photographs by Dr David Holyoak.

Reference: David T Holyoak – European Bryaceae, Pisces Publications 2021.

Fig.5 - *Bryum dichotomum*

Taxon	Common name	Status (Lockton & Whild 2005)	Last recorded in Shropshire	Occurrence up till 2019 (BSBI ddb)
Aconitum napellus	Monk's-hood	Scarce	2017	178
Agrostemma githago	Corncockle	Rare	2018	96
Alisma lanceolatum	Narrow-leaved Water-plantain	Scarce	2012	61
Allium oleraceum	Field Garlic	Rare	2013	25
Alopecurus aequalis	Orange Foxtail	Rare	2018	157
Alopecurus myosuroides	Black-grass	Scarce	2017	61
Antennaria dioica	Mountain Everlasting	Extinct	1969	14
Anthemis arvensis	Corn Chamomile	Rare	2008	43
Aristavena setacea (Deschampsia setacea)	Bog Hair-grass	Extinct	1932	3
Astragalus danicus	Purple Milk-vetch	Not in Shropshire	Not in Shropshire	Not in Shropshire
Astragalus glycyphyllos	Wild Liquorice	Rare	2009	50
Astrantia major	Astrantia	Rare	2018	69
Baldellia ranunculoides	Lesser Water-plantain	Extinct	2005	121
Bidens cernua var. *radiata*	Nodding Bur-Marigold	Rare	1998	5
Blysmus compressus	Flat-sedge	Extinct	1999	12
Bolboschoenus maritimus	Sea Club-rush	Rare	1999	14
Brachypodium pinnatum s.s.	Heath False-brome	Rare	2013	5
Bromopsis benekenii	Lesser Hairy-brome	Rare	2016	14
Bromus racemosus ssp. *commutatus*	Meadow Brome	Not in Shropshire	2017	17
Bromus racemosus ssp. *racemosus*	Smooth Brome	Rare	2018	28
Bromus secalinus	Rye Brome	Extinct	2017	66
Buglossoides arvensis (Lithospermum arvense)	Field Gromwell	Extinct	2011	36
Calamagrostis canescens	Purple Small-reed	Scarce	2013	193
Calamagrostis epigejos	Wood Small-reed	Scarce	2016	45
Callitriche hermaphroditica	Autumnal Water-starwort	Rare	2018	134
Campanula glomerata	Clustered Bellflower	Extinct	1999	28
Campanula patula	Spreading Bellflower	Scarce	2015	279
Cardamine bulbifera	Coralroot	Rare	1992	7
Cardamine impatiens	Narrow-leaved Bitter-cress	Extinct	2019	122
Carduus tenuiflorus	Slender Thistle	Rare	1994	16
Carex acuta	Slender Tufted-sedge	Scarce	2019	139
Carex acuta x *nigra* = *C.* x *elytroides*	Slender-tufted Common Sedge	Rare	2005	14
Carex diandra	Lesser Tussock-sedge	Extinct	1969	41
Carex digitata	Fingered Sedge	Rare	2018	21
Carex distans	Distant Sedge	Extinct	1892	12
Carex divulsa	Grey Sedge	Rare	2019	41
Carex elongata	Elongated Sedge	Scarce	2018	135
Carex lasiocarpa	Slender Sedge	Rare	2018	95

Carex lepidocarpa (Carex viridula ssp. *brachyrrhyncha)*	Long-stalked Yellow-sedge	Extinct	2010	25
Carex limosa	Bog-sedge	Extinct	1985	29
Carex montana	Soft-leaved Sedge	Scarce	2004	83
Carex muricata ssp. *muricata*	Prickly Sedge	Rare	2016	30
Carex otrubae x *remota = C.* x *pseudoaxillaris*		Extinct	2014	13
Carex paniculata x *remota = C.* x *boenninghausiana*		Rare	2013	15
Carex rostrata x *vesicaria = C.* x *involuta*		Extinct	2006	8
Carex viridula (Carex viridula ssp. *viridula*)	Small-fruited Yellow-sedge	Extinct	1997	48
Centaurea cyanus	Cornflower	Rare	2019	90
Cephalanthera damasonium	White Helleborine	Not in Shropshire	1974	5
Cephalanthera longifolia	Narrow-leaved Helleborine	Extinct	1986	30
Cerastium diffusum	Sea Mouse-ear	Rare	2008	22
Chamaemelum nobile	Chamomile	Extinct	1969	21
Chenopodium ficifolium	Fig-leaved Goosefoot	Scarce	2017	25
Cicuta virosa	Cowbane	Scarce	2017	242
Circaea alpina x *lutetiana = C.* x *intermedia*		Rare	2009	86
Cirsium acaule	Dwarf Thistle	Rare	2012	35
Cirsium dissectum	Meadow Thistle	Rare	2017	42
Cirsium eriophorum	Woolly Thistle	Scarce	2016	152
Cladium mariscus	Great Fen-sedge	Scarce	2018	95
Clinopodium ascendens	Common Calamint	Scarce	2017	104
Cryptogramma crispa	Parsley Fern	Rare	2016	23
Cuscuta epithymum	Dodder	Extinct	1999	37
Cynoglossum germanicum	Green Hound's-tongue	Not in Shropshire	Not in Shropshire	Not in Shropshire
Dactylorhiza fuchsii x *incarnata = D.* x *kernerorum*	0	Rare	2004	10
Dactylorhiza maculata x *Gymnadenia conopsea* = X *Dactylodenia legrandiana*	0	Extinct	1902	2
Dactylorhiza maculata x *praetermissa = D.* x *hallii (Dactylorhiza maculata* x *praetermissa = D. halleri)*	0	Rare	2006	7
Dactylorhiza purpurella	Northern Marsh-orchid	Rare	2016	40
Dactylorhiza viridis (Coeloglossum viride)	Frog Orchid	Scarce	2015	221
Dactylorhiza viridis x *Gymnadenia conopsea* = X *Dactylodenia jacksonii*		Extinct	1920	1
Damasonium alisma	Starfruit	Extinct	1849	18
Descurainia sophia	Flixweed	Rare	2012	38
Dianthus armeria	Maiden Pink	Extinct	1923	15
Dianthus deltoides	Deptford Pink	Rare	2017	183
Diphasiastrum alpinum	Alpine Clubmoss	Extinct	2017	17

Diplotaxis tenuifolia	Perennial Wall-rocket	Extinct	2017	40
Drosera anglica	Great Sundew	Extinct	1999	78
Drosera anglica x *rotundifolia* = *D.* x *obovata*	Round-leaved Sundew	Extinct	1965	16
Drosera intermedia	Oblong-leaved Sundew	Extinct	1999	51
Drymochloa sylvatica (Festuca altissima)	Wood Fescue	Scarce	2014	32
Dryopteris aemula	Hay-scented Buckler-fern	Extinct	1877	5
Dryopteris oreades	Mountain Male-fern	Rare	2011	12
Elatine hexandra	Six-stamened Waterwort	Rare	2016	110
Eleocharis acicularis	Needle Spike-rush	Rare	2018	89
Eleocharis multicaulis	Many-stalked Spike-rush	Scarce	2017	61
Eleogiton fluitans	Floating Club-rush	Scarce	2017	130
Epipactis leptochila	Narrow-lipped Helleborine	Extinct	1993	14
Epipactis palustris	Marsh Helleborine	Rare	2019	116
Epipactis phyllanthes	Green-flowered Helleborine	Rare	1998	31
Epipogium aphyllum	Ghost Orchid	Extinct	1892	6
Equisetum hyemale	Rough Horsetail	Extinct	1877	8
Equisetum palustre x *E. telamateia* = *E.* x *font-queri*		Not in Shropshire	Not in Shropshire	Not in Shropshire
Eriophorum latifolium	Broad-leaved Cottongrass	Rare	2017	40
Erodium maritimum	Sea Stork's-bill	Extinct	2012	32
Erodium moschatum	Musk Stork's-bill	Rare	2017	25
Euphrasia arctica	Arctic Eyebright	Rare	2016	13
Euphrasia micrantha	Slender Eyebright	Extinct	1991	11
Euphrasia officinalis ssp. *anglica (Euphrasia anglica)*	English Eyebright	Extinct	2018	9
Euphrasia officinalis ssp. *pratensis (Euphrasia rostkoviana)*	Large-flowered Sticky Eyebright	Rare	1964	4
Euphrasia scottica	Scottish Eyebright	Extinct	1911	3
Euphrasia stricta	Strict Eyebright	Not in Shropshire	Not in Shropshire	Not in Shropshire
Filipendula vulgaris	Dropwort	Rare	2019	46
Fumaria bastardii	Tall Ramping-fumitory	Not in Shropshire	2019	40
Fumaria densiflora	Dense-flowered Fumitory	Extinct	2019	24
Fumaria muralis x *officinalis* = *F* . x *painteri*		Extinct	1912	8
Fumaria officinalis ssp. *wirtgenii*	Common Fumitory	Scarce	2008	25
Fumaria purpurea	Purple Ramping-fumitory	Scarce	2019	130
Gagea lutea	Yellow Star-of-Bethlehem	Scarce	2017	121

Galeopsis angustifolia	Red Hemp-nettle	Rare	2018	96
Galium pumilum	Slender Bedstraw	Not in Shropshire	Not in Shropshire	Not in Shropshire
Gentiana pneumonanthe	Marsh Gentian	Rare	2017	66
Gentianella campestris	Field Gentian	Extinct	1999	60
Geranium rotundifolium	Round-leaved Crane's-bill	Rare	2019	11
Geranium sanguineum	Bllody Crane's-bill	Rare	2014	71
Geranium sylvaticum	Wood Crane's-bill	Scarce	2015	136
Groenlandia densa	Opposite-leaved Pondweed	Not in Shropshire	Not in Shropshire	Not in Shropshire
Gymnadenia conopsea	Chalk Fragrant-orchid	Scarce	2016	2
Gymnocarpium robertianum	Limestone Fern	Extinct	1957	5
Helictochloa pratensis (Helictotrichon pratense)	Meadow Oat-grass	Not in Shropshire	1979	3
Helleborus foetidus	Stinking Hellebore	Scarce	2018	171
Hieracium cinderella	Long-bracted Hawkweed	Scarce	2017	94
Hieracium grisedalense (Hieracium subcrassum)	Trackway Hawkweed	Rare	1909	1
Hieracium lasiophyllum	A Hawkweed	Rare	2014	37
Hippuris vulgaris	Mare's-tail	Extinct	2014	32
Hordelymus europaeus	Wood Barley	Scarce	2011	69
Hordeum secalinum	Meadow Barley	Extinct	2012	22
Hornungia petraea	Hutchinsia	Extinct	1877	7
Huperzia selago	Fir Clubmoss	Rare	2018	45
Hymenophyllum wilsonii	Wilson's Filmy-fern	Extinct	2018	18
Hypericum linariifolium	Toadflax-leaved St John's-wort	Extinct	1919	1
Hypericum montanum	Pale St John's-wort	Rare	2016	110
Hypochaeris glabra	Smooth Cat's-ear	Rare	1990	53
Hypopitys monotropa (Monotropa hypopitys)	Yellow Bird's-nest	Rare	2016	52
Impatiens noli-tangere	Touch-me-not Balsam	Rare	2014	95
Isoetes lacustris	Quillwort	Extinct	1969	10
Juncus compressus	Round-fruited Rush	Extinct	2017	8
Juncus subnodulosus	Blunt-flowered Rush	Scarce	2019	153
Juniperus communis	Common Juniper	Extinct	1999	16
Lathyrus aphaca	Yellow Vetchling	Extinct	1989	9
Lathyrus nissolia	Grass Vetchling	Rare	2016	24
Lathyrus sylvestris	Narrow-leaved Everlasting-pea	Rare	2016	110
Legousia hybrida	Venus's-looking-glass	Rare	2008	25
Lepidium latifolium	Dittander	Extinct	2013	11
Lepidium ruderale	Narrow-leaved Pepperwort	Rare	2017	19
Limosella aquatica	Mudwort	Extinct	2018	22
Linum radiola (Radiola linoides)	Allseed	Extinct	1939	17
Littorella uniflora	Shoreweed	Scarce	2016	118
Lobelia dortmanna	Water Lobelia	Extinct	1999	57

Lolium temulentum	Darnel	Extinct	1891	18
Lotus tenuis (Lotus glaber)	Narrow-leaved Bird's-foot-trefoil	Rare	2010	10
Luronium natans	Floating Water-plantain	Rare	2016	208
Lycopodiella inundata	Marsh Clubmoss	Extinct	1849	2
Lycopodium clavatum	Stag's-horn Clubmoss	Scarce	2019	154
Lysimachia minima	Chaffweed	Rare	2017	45
Marrubium vulgare	White Horehound	Rare	1997	81
Melica nutans	Mountain Melick	Rare	2015	38
Mentha pulegium	Pennyroyal	Extinct	2002	16
Myosurus minimus	Mousetail	Extinct	1970	4
Myrica gale	Bog-myrtle	Rare	2004	65
Myriophyllum alterniflorum	Alternate Water-milfoil	Scarce	2018	46
Myriophyllum verticillatum	Whorled Water-milfoil	Extinct	1998	31
Neotinea ustulata (Orchis ustulata)	Burnt Orchid	Extinct	1904	14
Neottia cordata (Listera cordata)	Lesser Twayblade	Extinct	1994	13
Nepeta cataria	Cat-mint	Extinct	2001	82
Nuphar pumila	Least Water-lily	Rare	2017	111
Oenanthe lachenalii	Parsley Water-dropwort	Extinct	1980	4
Omalotheca sylvatica (Gnaphalium sylvaticum)	Heath Cudweed	Scarce	2012	83
Ononis spinosa	Spiny Restharrow	Rare	2010	55
Ophrys insectifera	Fly Orchid	Extinct	1944	24
Orobanche minor	Common Broomrape	Rare	2017	57
Orobanche rapum-genistae	Greater Broomrape	Scarce	2018	125
Osmunda regalis	Royal Fern	Scarce	2018	181
Oxybasis urbica (Chenopodium urbicum)	Upright Goosefoot	Extinct	1957	14
Papaver lecoqii (Papaver dubium ssp. *lecoqii)*	Yellow-juiced Poppy	Extinct	1998	14
Parnassia palustris	Grass-of-Parnassus	Rare	2011	121
Pastinaca sativa	Wild Parsnip	Rare	2017	60
Persicaria minor	Small Water-pepper	Rare	2018	21
Persicaria mitis	Tasteless Water-pepper	Extinct	1979	9
Petrosedum forsterianum (Sedum forsterianum)	Stonecrops	Scarce	2019	345
Phegopteris connectilis	Beech Fern	Rare	2011	68
Pilularia globulifera	Pillwort	Extinct	1965	21
Pimpinella major	Greater Burnet-saxifrage	Rare	2009	30
Platanthera bifolia	Lesser Butterfly-orchid	Rare	2015	144
Polypodium cambricum	Southern Polypody	Rare	2015	28
Potamogeton alpinus	Red Pondweed	Rare	2012	118
Potamogeton alpinus x *praelongus = P.* x *griffithii*		Not in Shropshire	1967	1
Potamogeton coloratus	Fen Pondweed	Extinct	1892	7

Potamogeton compressus	Grass-wrack Pondweed	Extinct	2002	78
Potamogeton crispus x *perfoliatus* = *P.* x *cooperi*		Extinct	1882	9
Potamogeton friesii	Flat-stalked Pondweed	Extinct	2013	77
Potamogeton gramineus	Various-leaved Pondweed	Extinct	2014	46
Potamogeton gramineus x *lucens* = *P.* x *angustifolius*		Extinct	1905	26
Potamogeton lucens	Shining Pondweed	Extinct	2014	7
Potamogeton praelongus	Long-stalked Pondweed	Extinct	2018	44
Potentilla rivalis	Brook Cinquefoil	Rare	1993	3
Potentilla verna (Potentilla neumanniana)	Spring Cinquefoil	Not in Shropshire	1986	6
Pyrola media	Intermediate Wintergreen	Not in Shropshire	1985	5
Pyrola minor	Common Wintergreen	Rare	1999	39
Pyrola rotundifolia	Round-leaved Wintergreen	Extinct	1988	5
Ranunculus aquatilis x *peltatus* = *R* . x *virzionensis*		Rare	2007	4
Ranunculus arvensis	Corn Buttercup	Extinct	2010	96
Ranunculus sardous	Hairy Buttercup	Rare	2008	23
Ranunculus trichophyllus x *fluitans* = *R.* x *bachii*		Extinct	1897	2
Rhynchospora alba	White Beak-sedge	Rare	2014	88
Rosa spinosissima	Burnet Rose	Rare	2016	43
Rubus saxatilis	Stone Bramble	Extinct	1994	20
Sabulina tenuifolia (Minuartia hybrida)	Fine-leaved Sandwort	Extinct	1841	2
Sagina nodosa	Knotted Pearlwort	Scarce	2018	94
Sagittaria sagittifolia	Arrowhead	Rare	2017	154
Salix myrsinifolia	Dark-leaved Willow	Extinct	1982	5
Salix purpurea	Purple Willow	Scarce	2018	110
Salix repens	Creeping Willow	Rare	2013	52
Salvia pratensis	Meadow Clary	Extinct	1841	5
Salvia verbenaca	Wild Clary	Extinct	2017	24
Samolus valerandi	Brookweed	Rare	2012	31
Sanguisorba officinalis	Great Burnet	Rare	2016	60
Saxifraga hypnoides	Mossy Saxifrage	Extinct	1979	16
Scandix pecten-veneris	Shepherd's-needle	Extinct	1994	36
Scheuchzeria palustris	Rannoch-rush	Extinct	1885	46
Schoenoplectus tabernaemontani	Grey Club-rush	Scarce	2009	40
Scleranthus annuus ssp. *polycarpos (Scleranthus annuus)*	Annual Knawel	Rare	1982	5
Selaginella selaginoides	Lesser Clubmoss	Not in Shropshire	Not in Shropshire	Not in Shropshire
Senecio cambrensis	Welsh Groundsel	Not in Shropshire	Not in Shropshire	Not in Shropshire
Serratula tinctoria	Saw-wort	Rare	2015	114

Silene conica	Sand Catchfly	Extinct	1987	4
Silene gallica	Small-flowered Catchfly	Extinct	2014	24
Silene noctiflora	Night-flowering Catchfly	Extinct	2015	24
Silene nutans	Nottingham Catchfly	Rare	1995	16
Sium latifolium	Greater Water-parsnip	Not in Shropshire	1956	3
Sorbus anglica	English Whitebeam	Rare	2017	137
Sorbus domestica	Service-tree	Rare	2019	11
Sorbus rupicola	Rock Whitebeam	Not in Shropshire	1975	1
Sparganium natans	Least Bur-reed	Extinct	1994	68
Stellaria nemorum	Wood Stitchwort	Local status uncertain	1969	13
Stellaria palustris	Marsh Stitchwort	Rare	2018	48
Subularia aquatica	Awlwort	Extinct	1805	2
Thalictrum flavum	Common Meadow-rue	Rare	2017	84
Thalictrum minus	Lesser Meadow-rue	Extinct	2012	10
Thelypteris palustris	Marsh Fern	Rare	2017	110
Tilia platyphyllos	Large-leaved Lime	Scarce	2019	174
Torilis nodosa	Knotted Hedge-parsley	Rare	2012	51
Trichophorum cespitosum	Northern Deergrass	Scarce	1840	3
Trollius europaeus	Globeflower	Scarce	2013	163
Turritis glabra	Tower Mustard	Extinct	1991	68
Ulmus minor	Small-leaved Elm	Rare	2017	35
Ulmus plotii	Plot's Elm	Rare	1980	9
Utricularia australis	Bladderwort	Not in Shropshire	Not in Shropshire	Not in Shropshire
Utricularia minor	Lesser Bladderwort	Rare	2017	57
Utricularia vulgaris	Greater Bladderwort	Extinct	1992	54
Vaccinium myrtillus x *vitis-idaea* = *V*. x *intermedium*	Cowberry	Rare	2007	12
Vaccinium vitis-idaea	Cowberry	Scarce	2016	183
Valerianella dentata	Narrow-fruited Cornsalad	Rare	2000	48
Valerianella eriocarpa	Hairy-fruited Cornsalad	Extinct	1923	7
Verbascum lychnitis	White Mullein	Rare	1997	16
Vicia lathyroides	Spring Vetch	Rare	2019	18
Viola canina	Heath Dog-violet	Scarce	2018	50
Wahlenbergia hederacea	Ivy-leaved Bellflower	Scarce	2015	100